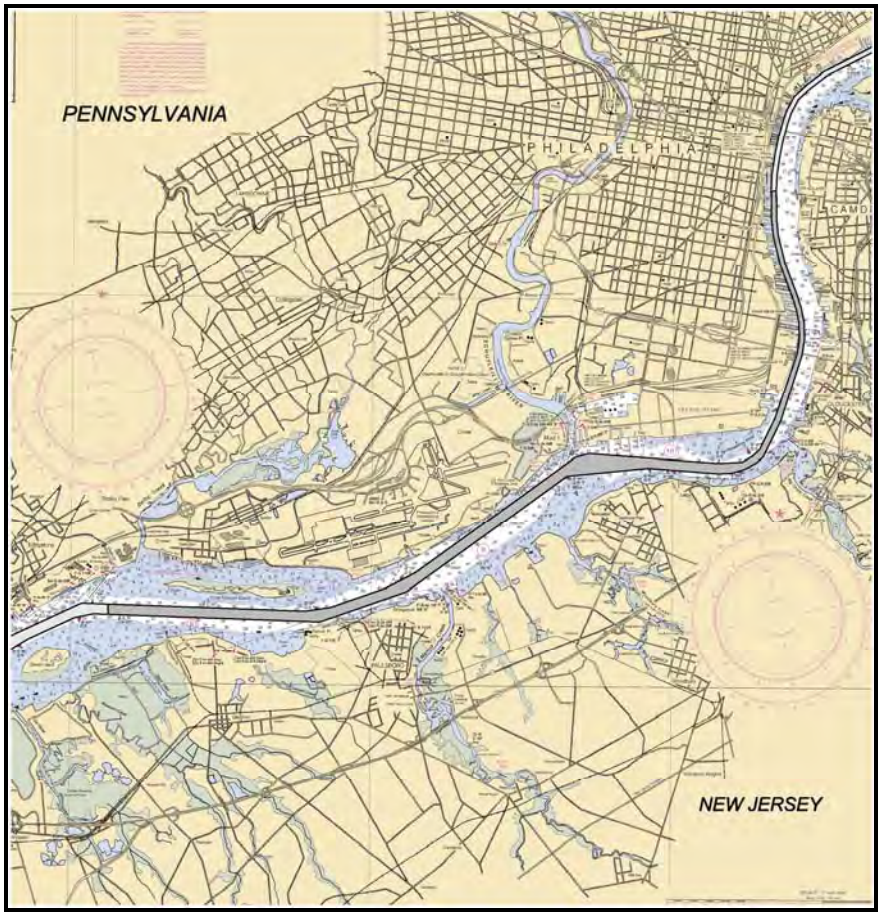
Philadelphia Regional Port Authority
U.S. Army Corps of Engineers – Philadelphia District

DELAWARE RIVER MAIN CHANNEL DEEPENING PROJECT

Investigation of Submarine Utility Crossings
Stations 19+700 to 96+000

October 2012



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1.0 INTRODUCTION

In June 2011, Gahagan & Bryant Associates, Inc. (GBA) conducted an investigation of submarine utility crossings within the Delaware River federal shipping channel for the authorized Delaware River Main Channel Deepening Project (DRMCD) as shown in Figure 1. That investigation covered the majority of Reach B between Stations 96+000 and 176+000. Subsequently, GBA was tasked to conduct an investigation for Stations 19+700 to 96+000 of the DRMCD, similar to the one conducted for Reach B. This report presents the findings for the subject stationing.

2.0 PURPOSE

The purpose of this investigation is to update the U.S. Army Corps of Engineers (Corps) 1996 submarine utility crossing investigation. It is vital that the presence of submarine utility crossings be identified and verified. The information gathered as part of this investigation will be used by the Corps and their contractor(s) to develop a plan for the dredging of sediment material within the investigation stationing as part of the performance of the DRMCD. The plan calls for sediment removal to 46 feet below the National Oceanic and Atmospheric Administration's Mean Lower Low Water (NOAA MLLW) level.

3.0 PROJECT SITE

The area for this study is shown on Figure 2 and extends from Station 19+700 to 96+000, approximately 14.5 miles. Reach A-A extends from Stations 19+700 to 32+755, Reach A from 32+755 to 90+000, and a portion of Reach B from Stations 90+000 to 96+000. Within these reaches, the Delaware River shipping channel is currently maintained by the Corps to the authorized depth of 40 feet below NOAA MLLW and is anticipated to be deepened to 45 feet below MLLW in the future. It varies in width from 400 feet in the upper part of Reach A-A (Stations 19+700 to 32+000), and transitions from 400 feet to 800 feet in Reach A (Stations 32+000 to 43+000), and is bordered by New Jersey on the east and Pennsylvania to the west.

4.0 SCOPE OF WORK

The following tasks were conducted.

- Collection of available information/data prepared by the Corps for the DRMCD.
- Review of permits issued by the Corps' Regulatory Branch for submarine utility crossings.
- Coordination with United States Coast Guard (USCG) and National Oceanic and Atmospheric Administration (NOAA).
- Compilation and review of collected information/data.
- Contacted and coordinated with the utility owners/operators to verify existing crossings and to inquire if there are any other utility crossings.
- Performance of landside surveys to verify existing/known utility crossings.
- Documentation of findings and preparation of this report.

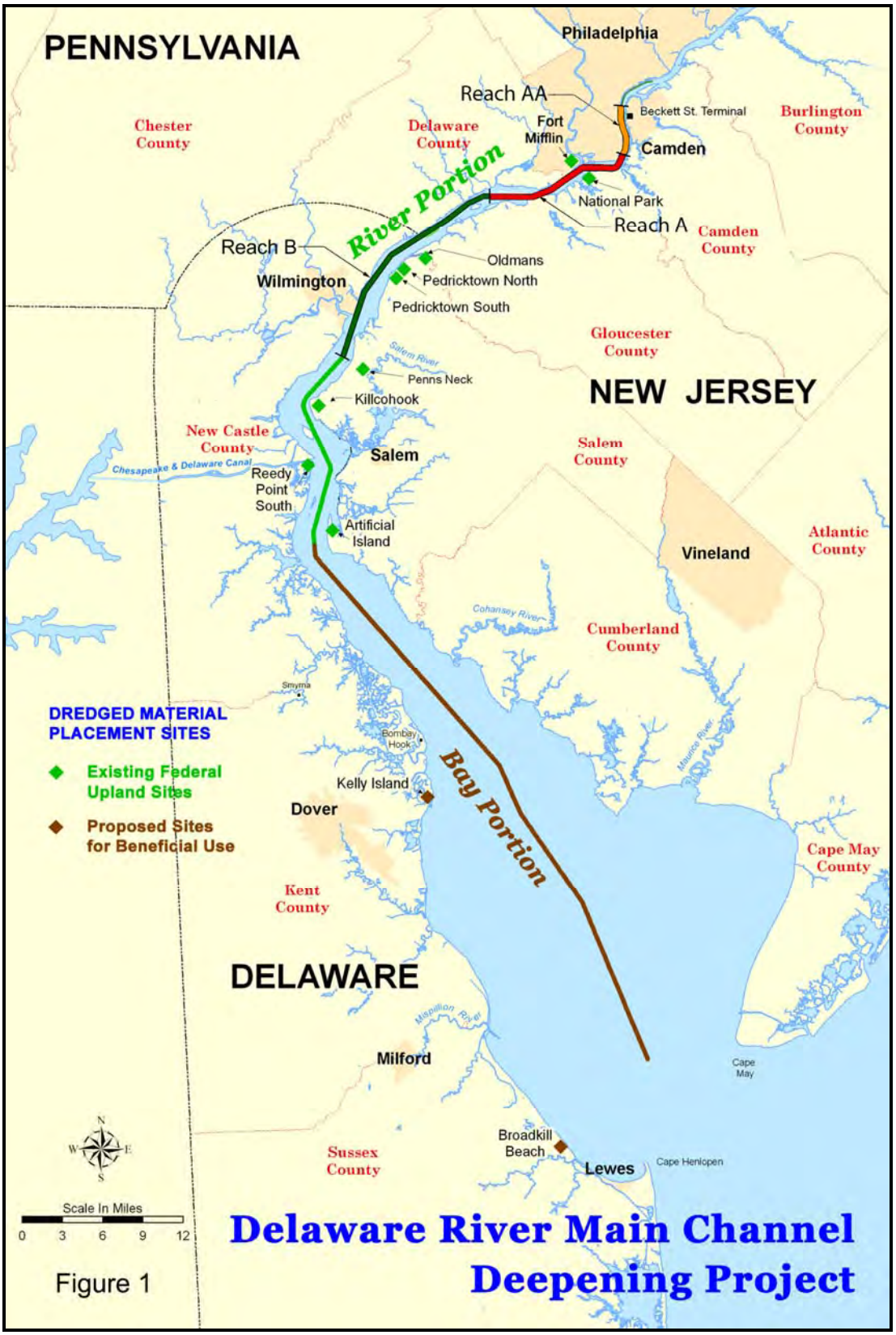
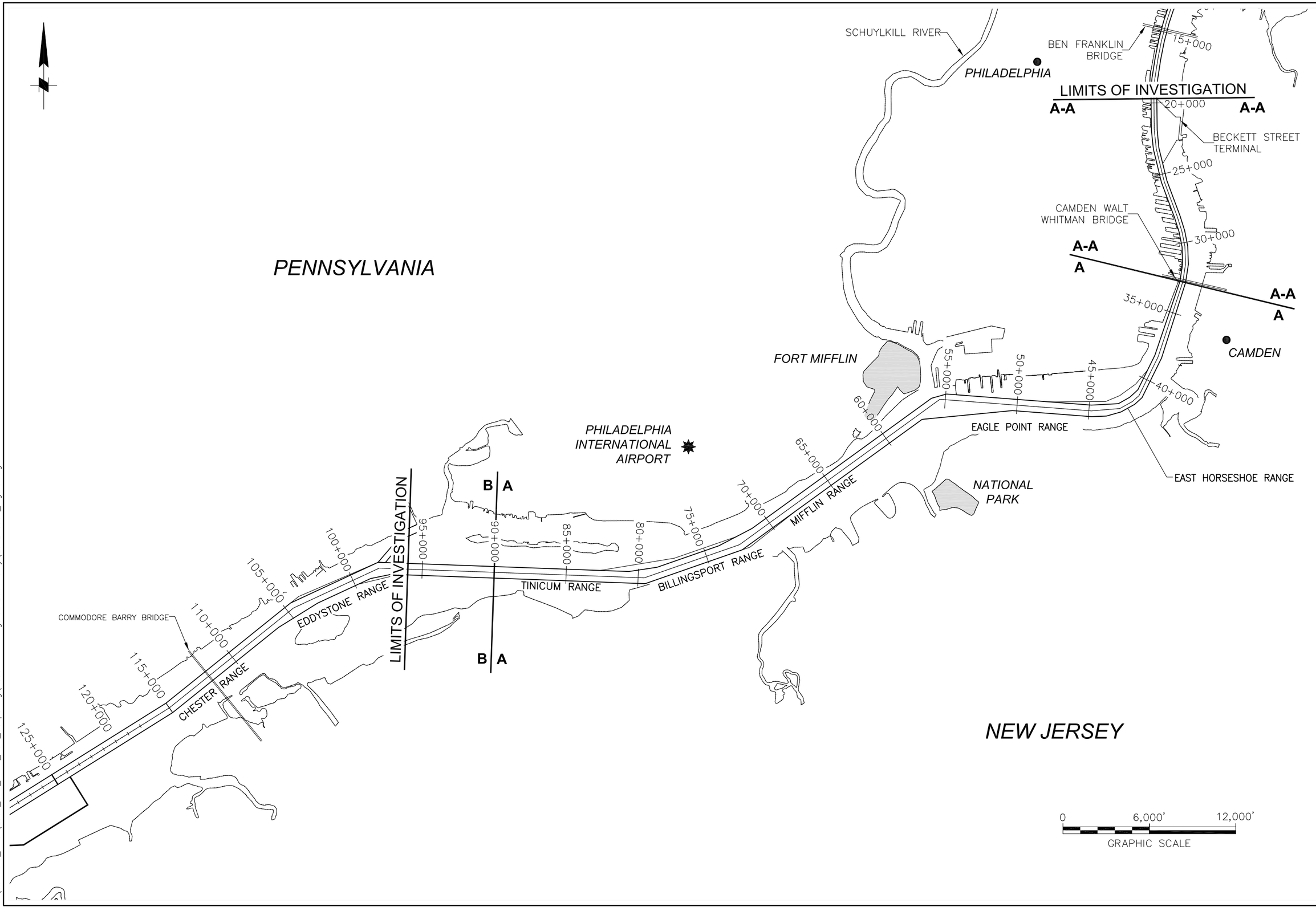


Figure 1 Project Location Map



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Reviewed by:
Submitted by:
Date: JULY 2012
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Rev.

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DELAWARE RIVER DEEPENING PROJECT

FIGURE 2: PROJECT SITE

SEAL

FIGURE 2
Page 3

5.0 GATHERING OF INFORMATION

5.1 CORPS PAST INVESTIGATIONS

At the outset of this investigation, GBA met with Corps representatives to obtain information and any data that was collected as part of the Corps' 1996 submarine utility investigation and subsequently within Reaches A-A and A. At that time, the Corps contacted the owners of the utility lines that were identified at the time to verify the location of their submarine lines. The information gathered from that effort was provided to GBA along with a map of the known crossings.

5.2 CORPS REGULATORY PERMIT PROCESS/ REVIEW OF FILES

Any proposed submarine utility crossing that would transverse the existing Delaware River 40-foot federal channel must be approved by the Corps. The owner needs to submit a permit application for Corps review and approval. The permit needs to include a plan of the proposed crossing that shows the horizontal and vertical layout of the utility line so that a determination can be made if there is a potential impact to the maintenance dredging of the 40-foot federal channel.

During a previous investigation of submarine utilities in Reach B, GBA met with the Corps to discuss the current permit application process and vertical clearance requirements below the existing authorized Delaware River 40-foot federal channel. A sample copy of the application package for applying for a permit as well as special conditions (effective since September 21, 2006) was furnished. Appendix A contains excerpts from those special conditions that are relevant for submarine cables and pipelines proposed for crossing the federal channel.

The Corps provided GBA with the information that they had gathered as part of their previous investigations. This information included some as-built survey drawings and correspondence (e-mails) with several owner/operators.

The Corps' permit files of submarine utility crossings of the Delaware River federal shipping channel that could be located between Stations 19+700 and 96+000 were unavailable for this investigation.

5.3 INITIAL CONTACT WITH OWNER/OPERATORS

For the most part, the information available from the Corps was incomplete and could not be presented to the owner/operators for their verification (as was done for the Reach B investigation). Due to a lack of information at the outset of this investigation, GBA initially contacted the majority of the owner/operators by telephone and e-mail to seek additional information to supplement that from the Corps. During this process, numerous follow-ups were made to get the requested information or to clarify our involvement. In addition, as part of this effort, the Corps was contacted to assist in getting the information or data.

5.4 CONSOLIDATION OF AVAILABLE INFORMATION/DATA

Using the information that was initially provided by the Corps and subsequently supplemented by the owner/operators, a tabulation of utility crossing information by owner was compiled (see Table 1). It was noted that all of these crossings were located in Reach A and none in Reach A-A.

From the above investigation, copies of Corps permits for initial construction were obtained for only three of the utility crossings – R, T and U. In addition, a permit drawing (without a

permit) for U2 and a permit to lower a portion of V and W pipelines for the expansion of the Mantua Creek Anchorage Area were also obtained.

GBA was able to obtain as-built surveys for the utilities identified as Q, R, U, U2, Y and Y2. The owners of the remaining utilities (O, O2, O3, T, V and W) were not able to locate as-built drawings. They cited the many ownership changes over the last six decades or so since the submarine utility lines had been constructed as the reason for not possessing that information.

The above information was summarized in Table 1 and served as the basis for final written coordination and validation of the submarine utility crossings with the owners.

Table 1 Delaware River Reach a Submarine Utility Crossings (Summary)

UTIL.	OWNER/OPERATOR/CONTACT	DESCRIPTION	PERMIT INFORMATION	AS-BUILT
O	**Buckeye Partners LP** Contact: Steve Wright Phone: (610) 695-8015	One 10-inch pipeline (inactive)	Permit not available	No
O2	**PBF Energy** Contact: Sam DeGeorge Phone: (856) 224-4536	One 8-inch natural gas pipeline	Permit not available	No
O3	**Buckeye Partners LP** Contact: Steve Wright Phone: (610) 695-8015	One 8-inch jet fuel pipeline w/in a 12-inch casing	Permit not available	No
Q	**Buckeye Partners LP** Contact: Steve Wright Phone: (610) 695-8015	One 12-inch directionally drilled pipeline	Permit not available	Yes
R	**Sunoco Logistics Partners LP** Contact: James Franciscus Phone: (610) 670-3309	One directionally drilled pipeline bundle w/one 6-inch & three 8-inch pipelines	Application submitted: NA Permit issued: 06/08/94 Permit #: CENAP-OP-R-199400321-15	Yes
T	**Buckeye Partners LP** Contact: Steve Wright Phone: (610) 695-8015	One 24-inch. product pipeline	Application submitted: 10/09/57 Permit issued: 03/25/58 Permit #: NAPKA	No
U	**Colonial Pipeline Company** Contact: Greg Herbstritt Phone: (856) 381-4680	One 10-inch gas pipeline (inactive)	Application submitted: 06/14/63 Permit issued: 04/06/64 Permit #: NAPOP-N	Yes
U2	**Colonial Pipeline Company** Contact: Greg Herbstritt Phone: (856) 381-4680	One 10-inch gas pipeline	Permit drawing dated 11/23/64. Permit not available.	Yes
V	**Phillips 66*** **(formerly ConocoPhillips)** Contact: Laura Schoenberger Phone: (832) 486-3347	One 8-inch product pipeline	Application to lower pipe Submitted: 09/28/64 Permit issued: 02/09/65 Permit #: NAPOP-N	No
W	**Sunoco Logistics Partners LP** Contact: James Franciscus Phone: (610) 670-3309	One 12-inch product pipeline	Application to lower pipe Submitted: 09/28/64 Permit issued: 02/09/65 Permit #: NAPOP-N	No
Y	**Williams Gas Pipeline Transco** Contact: Richard Ricketts Phone: (609) 936-2413	One 10-inch gas pipeline	Permit not available	Yes
Y2	**Williams Gas Pipeline Transco** Contact: Richard Ricketts Phone: (609) 936-2413	One 10-inch. gas pipeline	Permit not available	Yes

* Ownership in process of being transferred to **Monroe Energy, LLC**.
Contact: Coby Stewart Phone: (610) 364-8663

6.0 COORDINATION WITH USCG AND NOAA

As noted in the June 2011 Reach B utility investigation report, special conditions contained in the more recent Corps permits (1987 and later) for utility crossings require the permittee to coordinate their construction work/procedures with the USCG and to provide NOAA, within 60 days of completion of the work, with a certification that the utility has been installed in compliance with the approved plans (see Appendix A, A.2 Special Permit Conditions for Cables, CABLE 3 and CABLE 10; and Appendix A, A.3 Special Permit Conditions for Pipelines PIPE 3 and PIPE/FED).

Of the three permits found, only the one for Sunoco Logistics (Utility R) incorporated the above special conditions. They do not appear in the other two permits, which were issued prior to 1987.

6.1 U.S. COAST GUARD

As part of the June 2011 Reach B investigation, GBA contacted the USCG Philadelphia office to determine their involvement with the submarine utility crossings in the Delaware River shipping channel.

Specifically, information was requested for the following:

1. Does the USCG have any authority over submarine utility crossings in the Delaware River?
2. Does the USCG retain or compile a database of submarine utility crossings in the Delaware River? If yes, can it be provided to GBA?

The Coast Guard stated that their authority over submarine utility crossings only extends to the issuance of advisory Notices to Mariners during the construction/installation process and they do not maintain a database.

6.2 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

GBA reviewed NOAA Nautical Chart 12312 (55th Edition, August 2009), which shows "pipeline and cable areas" crossing the Delaware River navigation channel in Reach A. Subsequently, GBA provided NOAA with a copy of the Corps' drawing showing the Reach A crossings. NOAA was asked to review the Corps' drawing. Furthermore, it was requested that NOAA provide information from their files that they used as a basis for identifying and locating pipeline and cable areas on Chart 12312 and within Reach A, particularly any not shown on the Corps' drawing.

NOAA furnished GBA with copies of the requested file data. The file data was subdivided into two categories as noted below.

Category 1 Information sent directly to NOAA by the permittees per the previously referenced special permit conditions (CABLE 3 and PIPE/FED).

Category 2 Charts marked with general crossing locations provided to NOAA by the Chief, Construction Operations Division, Directorate of Civil Works, Office of the Chief of Engineers.

From the provided files the following observations were made.

Sunoco Logistics (Utility R) was the only utility included in Category 1. Utilities T, U, U2, V, W, Y and Y2 were not specifically identified in the Category 2 data and only generally located by general terms such as “pipeline area”. NOAA was unable to locate the source information which resulted in adding the “pipeline area” designation to their chart where utilities O, O2, O3 and Q crossed the Delaware River.

As previously determined in the utility investigation for Reach B, the earliest data in category 1 was available from 1987 and for category 2 the latest data provided to NOAA was in 1975. It is apparent that sometime between 1975 and 1987 special conditions were added to Corps permits for submarine utility crossings requiring the permittee to notify both the USCG and NOAA of their activities. Prior to that time, such notification, if done, appears to have been made directly by the Corps.

No previously unknown crossings were identified through this process.

From the above coordination, it was determined that NOAA is solely responsible for overlaying or marking the location of the submarine utility lines on their navigation charts so as to notify mariners of the potential for damage to the utilities from dragging anchors.

7.0 VERTICAL DATUM CONVERSION/ADJUSTMENTS

Based on the review of the compiled information and data, several different vertical datums were utilized in conducting the various as-built drawings. To convert the information from the as-built drawings to the project datum (NOAA MLLW), a review of varying and historical Delaware River tidal datums was performed.

From the 1960’s until the mid to late 1990’s, the Philadelphia District Corps utilized Corps of Engineers Mean Low Water (COE MLW) for the Delaware River 40-foot project that extends from Philadelphia, PA to the Delaware Bay, the same foot print as the DRMCD. COE MLW was referenced to Delaware River Datum (DRD) and all tide gauges and benchmarks were established in DRD. DRD was also referenced to the current geodetic vertical datum of the time, National Geodetic Vertical Datum of 1929 (NGVD 29). DRD was stated to be 2.901 feet below NGVD 29. COE MLW corrections ranged from 0.10 to 0.50 foot above DRD, depending on what range of the Delaware River was being surveyed. The 0.50 foot correction was applied in the vicinity of the Schuylkill River in Philadelphia, PA, and decreased to 0.10 foot in Delaware Bay as the channel headed outbound to the ocean.

The Corps migrated over time (starting in the late 1990’s) from COE MLW to NOAA MLLW established by NOAA based upon the most recent tidal epoch and observations. The adjustment from COE MLW to NOAA MLLW was mandated by Executive Order so that the same vertical datum that NOAA utilized for their mapping in and around coastal and river environments was recognizable nationally. The current NOAA Epoch is 1983-2001, which superseded the previous 1960-1978 Epoch. The North American Vertical Datum of 1988 (NAVD 88) is another reference point that was used. Figure 3 shows the relationships of the various tidal and geodetic datums to the project datum in the vicinity of the three clusters of utility crossings in Reach A.

GBA reviewed the vertical datums from the as-built drawings available for the utility crossings shown in Table 1 to determine their relationships to the project datum (see Appendix B).

Table 2 on page 9 shows the datum used for each as-built survey drawing and the minimum depth of the utility crossing in the channel referenced to both the as-built datum used and as adjusted to the project datum.

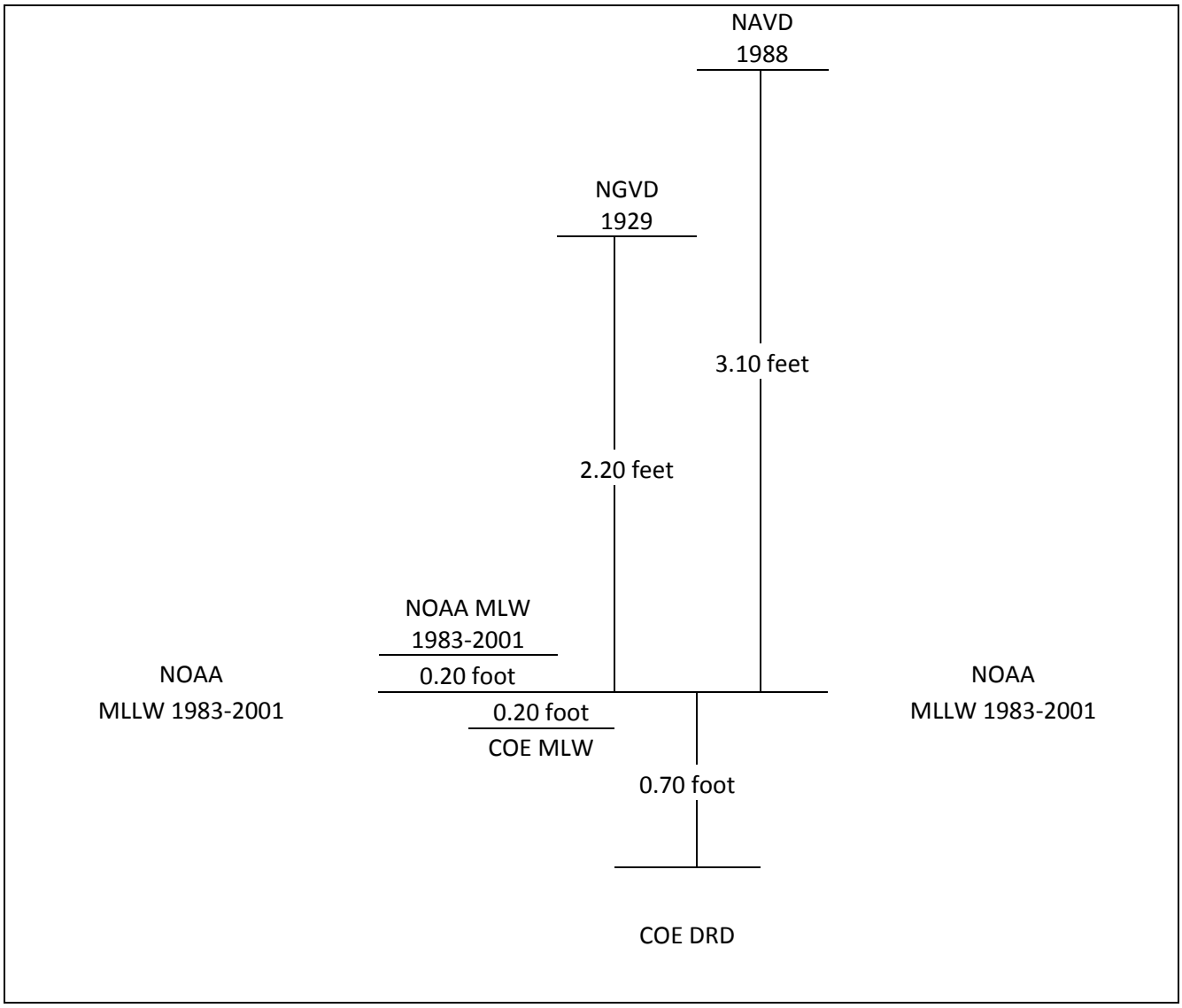


Figure 3 Vertical Datum Conversions – Reach A

Notes:

1) *The above conversions are only applicable in the vicinity of the utility crossings in Reach A.*
2) *The correction factor between NAVD 88 and NOAA MLLW ranges from 3.03 feet to 3.23 feet within the study area. For the three ranges containing submarine utility crossings – Billingsport, Mifflin and "M" – the correction factors are 3.05 feet, 3.06 feet and 3.10 feet, respectively.*
3) *A conservative correction factor of 3.10 feet was used above as a variation of 0.05 foot is considered negligible for the purposes of this investigation.*

Table 2 As-Built Survey/Project Vertical Datum Information

Current Owner/Operator	Utility Description	Location	Date of Survey[2]	Minimum Below Survey Datum In Channel (feet)	Survey Datum Description	Minimum Below Project Datum (NOAA MLLW) In Channel (feet)
Buckeye Partners (O)	1-10 inch pipeline (inactive)	Billingsport Range	Various[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
PBF Energy (O2)	1-8 inch natural gas pipeline	Billingsport Range	05/10/11[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
Buckeye Partners (O3)	1-8 inch jet fuel pipeline w/in 12 inch casing	Billingsport Range	Various[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
Buckeye Partners (Q)	1-12 inch directionally drilled pipeline	Billingsport Range	06/04/07	89.8	"Independent Datum" (MLLW -3.23' below datum)	86.6
Sunoco Logistics (R)	1-directionally drilled pipeline bundle (1-6 inch and 3-8 inch pipelines)	Billingsport Range	12/05/94	65.0	"NGVD 1929" (MHW +3.58', MLW -1.97')	62.8
Buckeye Partners (T)	1-24 inch product pipeline	Mifflin Range	10/09/57[4]	60.0	"DRD" (MHW +6.2', MLW +0.54')	60.7[6]
Colonial Pipeline (U)	1-10 inch gas pipeline (inactive)	Mifflin Range	08/22/64	58.5	"DRD" (MLW +0.54')	59.2
Colonial Pipeline (U2)	1-10 inch gas pipeline	Mifflin Range	09/02/65	58.0	"DRD" (MHW +6.2', MLW +0.54')	58.7
Phillips 66 (V)[1]	1-8 inch pipeline	Mifflin Range	04/26/12[5]	53.4	"MLLW" (NAVD 88 +3.2')	53.4[7]
Sunoco Logistics (W)	1-12 inch pipeline	Mifflin Range	04/26/12[5]	53.4	"MLLW" (NAVD 88 +3.2')	53.4[7]
Williams GP/Transco (Y & Y2)	2-10 inch gas pipelines	"M" Range	07/18/63	69.2	"MSL USC&GS Datum" (MHW-U.S.E.D. +3.37', MLW-U.S.E.D. -2.90', presumed to be NGVD 29)	67.0

Notes

[1] *Formerly ConocoPhillips and currently in process of being transferred to Monroe Energy, LLC.*

[2] *As-built surveys unless otherwise noted.*

[3] *Not from an as-built survey - information from hydro surveys made to check sediment cover over pipeline, which showed pipe depths based on permit drawings.*

[4] *Not from an as-built survey - proposed pipe depth from permit drawing.*

[5] *Not from an as-built survey - information from sub-bottom sonar survey conducted to confirm location and depth of pipeline.*

[6] *Based on project design depth and not verified by post construction survey.*

[7] *Survey report recommends a 2-foot ± tolerance for pipeline depths determined by the survey.*

8.0 COORDINATION WITH OWNER/OPERATORS

Initial contact with most of the owner/operators was made on an informal basis as described previously in Section 5.3. As noted below, initial verification packages were sent early in the investigation process to only two of the six owner/operators (Colonial Pipeline and Williams Gas Pipeline Transco). This was due to their pipelines (U and Y/Y2, respectively) being the only utility lines for which as-built drawings were initially available.

Relevant information from the various sources was consolidated and summarized in Table 1. GBA subsequently prepared final verification packages to each of the identified owner/operators. The packages included a cover letter and copies of the relevant documents GBA had obtained for each submarine utility crossing. The cover letters cited previous contacts for information by GBA, summarized current information available for each utility, presented any observations/questions/concerns and requested any additional information that might be helpful. If they had no additional information to provide, the owner/operators were requested to confirm that the information referenced in the letter properly documents the status and location of their respective submarine utilities. The packages were sent both electronically by e-mail and through the mail with receipt confirmation verified.

The packages sent to each owner/operator and their formal responses are included in Appendix C. It should be noted that any discrepancies between Appendix C and other sections of this report regarding utility depth and landside coordinate information are due to earlier source data being superseded by more reliable data. The reader is directed to Tables 2 and 3, and Figures 4, 4A, 4B and 4C for GBA's best representation of utility depths and landside coordinates based on the most recently available information.

The coordination by owner is summarized below.

1. ***Buckeye Partners, L.P.*** **–** Final verification package sent 11 April 2012. No formal response provided to the package. Response e-mail dated 11 April 2012 stated that Buckeye had no additional information to provide.
2. ***PBF Energy*** – Final verification package sent 11 April 2012. No response provided to the package.
3. ***Sunoco Logistics Partners, L.P.*** **–** Final verification package sent 11 April 2012. No formal response provided to the package. Sunoco, however, had previously indicated they were planning to conduct a "sonar survey" to verify the horizontal and vertical location of their 12-inch pipeline (W) and, pending their participation, that of the adjacent 8-inch pipeline (V) operated by Phillips 66 (formerly ConocoPhillips).
4. ***Colonial Pipeline Company*** **–** Initial verification package sent 19 December 2011. No response provided to the initial package.

   Final verification package sent 11 April 2012. No formal provided to the package. Response e-mail dated 30 April 2012 agrees that information supplied to owner/operator is consistent with their as built information, but they do not guarantee the accuracy of the data. Furthermore, thee-mail states that they plan to conduct "scanning sonar hydrographic surveys" of their pipelines in late May of 2012.

5. ***Phillips 66 (formerly ConocoPhillips)* –** Final verification package sent 11 April 2012. No formal response provided to the package. *(See no. 3 above.)*

6. ***Williams Gas Pipeline Transco* –** Initial verification package sent 21 November 2011. Formal response dated 14 December 2011 agrees that information supplied is consistent with their as-built information.

   Final verification package sent 13 April 2012. No formal response provided to the package. Response e-mail dated 2 May 2012 agrees that information supplied is consistent with their as-built information. They request an opportunity to review and approve any blasting plan, should it be required within 200 feet of their pipelines.

9.0 LANDSIDE SURVEYS

Approximate locations of the utility crossings were initially provided to GBA by the Corps. These locations were based on information obtained by the Corps from the owner/operators. In order to further verify those locations, GBA contacted the owners/operators of the submarine utilities for permission to access their respective utility landing sites for the purpose of conducting landside surveys. Verbal permission was given, along with contact information from the various owner/operator field representatives. GBA's surveyor contacted each of the representatives to coordinate the site surveys. The landing location surveys were accomplished on 6 February 2012 and are included in Appendix D.

Figure 4 depicts the utility crossing locations as determined by the utility landing site surveys and other information obtained by GBA as part of this investigation. As noted on Figure 4, there are three cluster areas of utility crossings, all located within Reach A. These are shown in more detail on Figures 4A, 4B and 4C. For some of the utility crossings (e.g. those with more than one pipeline or with curvilinear or angular changes in the alignment) additional information from the permit drawings, correspondence between the Corps and the owner/operators, and the as-built drawings was used to create a "crossing location envelope". The utilities are expected to be located somewhere in the general vicinity of these individual crossing location envelopes.

LEGEND

- – – – – UTILITY LOCATION BASED ON AS-BUILT DRAWINGS AND/OR PERMIT DRAWINGS
- ——— UTILITY LOCATION BASED ON GBA'S LANDINGS LOCATION SURVEYS
- – – – – UTILITY LOCATION BASED ON AS-BUILT PLAN VIEW ADJUSTED TO GBA'S LANDINGS LOCATION SURVEYS

NOTE: ALL OF THE UTILITY INFORMATION PRESENTED WAS COMPILED FROM AVAILABLE INFORMATION AND SHOULD BE CONSIDERED AS APPROXIMATE.

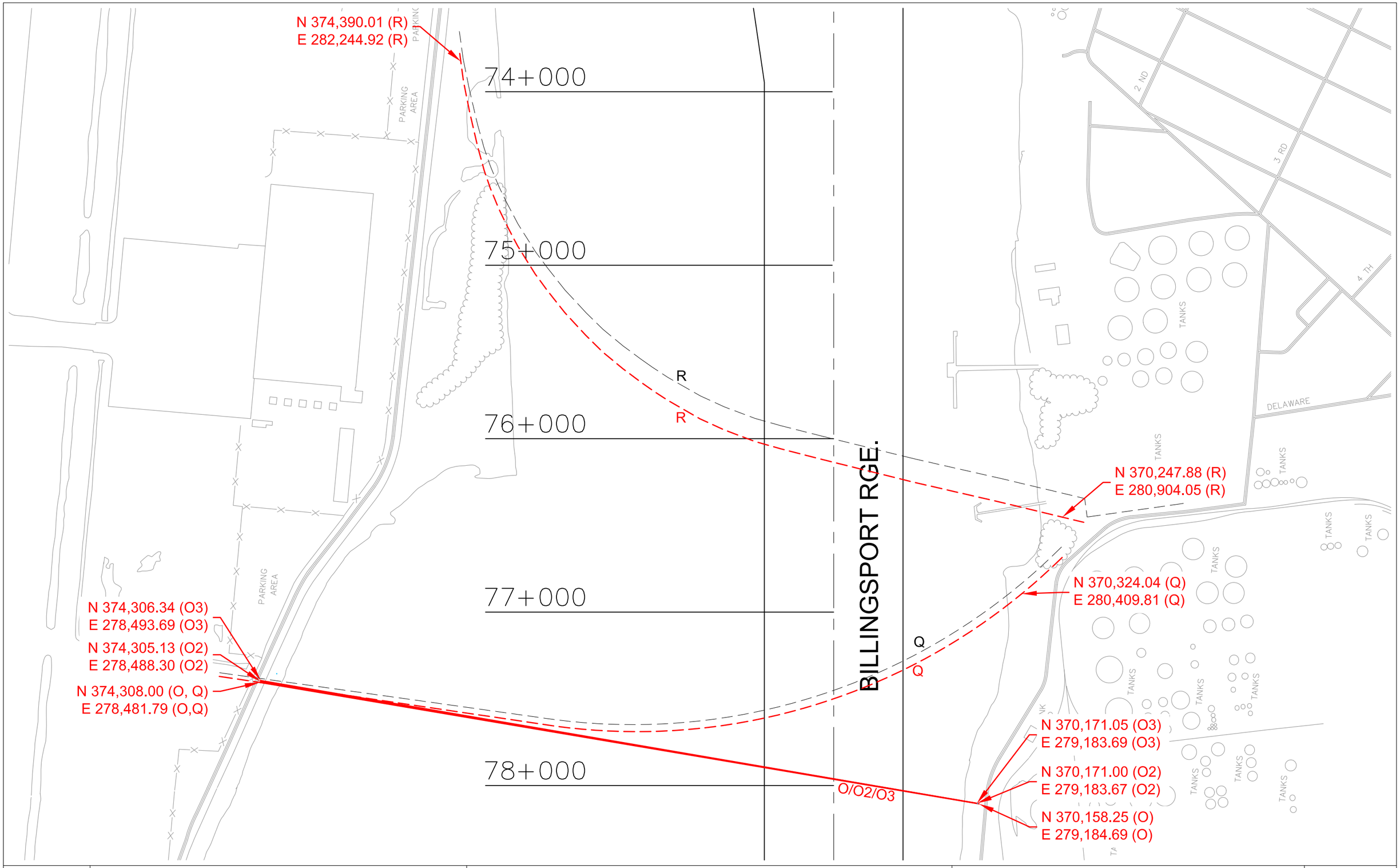
GRAPHIC SCALE (IN FEET)

3000 0 3000 6000

GBA ENGINEERS ★ SURVEYORS

DELAWARE RIVER DEEPENING REACH A SUBMARINE UTILITY CROSSINGS

FIGURE 4

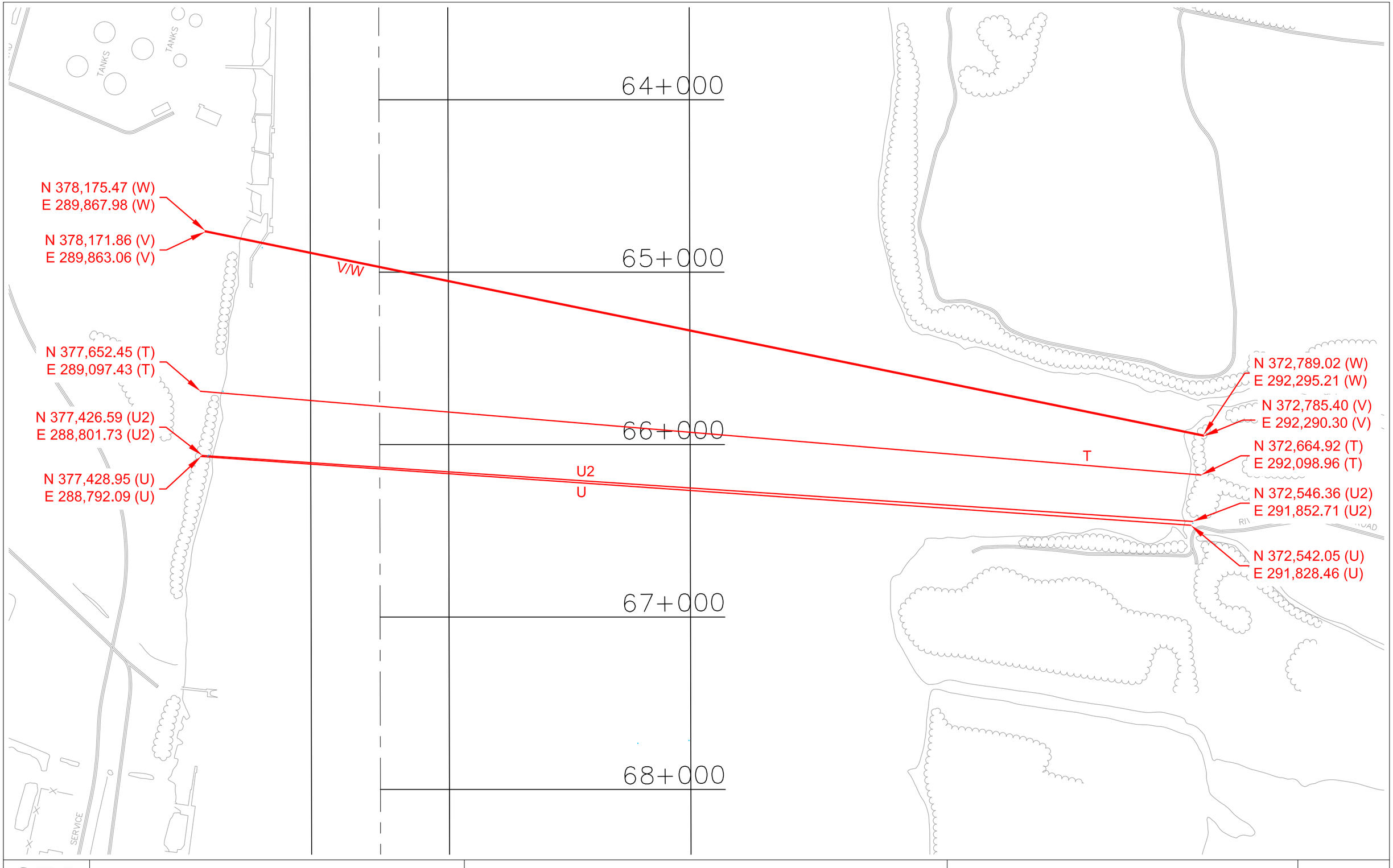


GBA ENGINEERS ★ SURVEYORS

REACH A UTILITY CROSSINGS

BUCKEYE (O/O3/Q), PBF ENERGY (O2), SUNOCO LOGISTICS (R)

FIGURE 4A

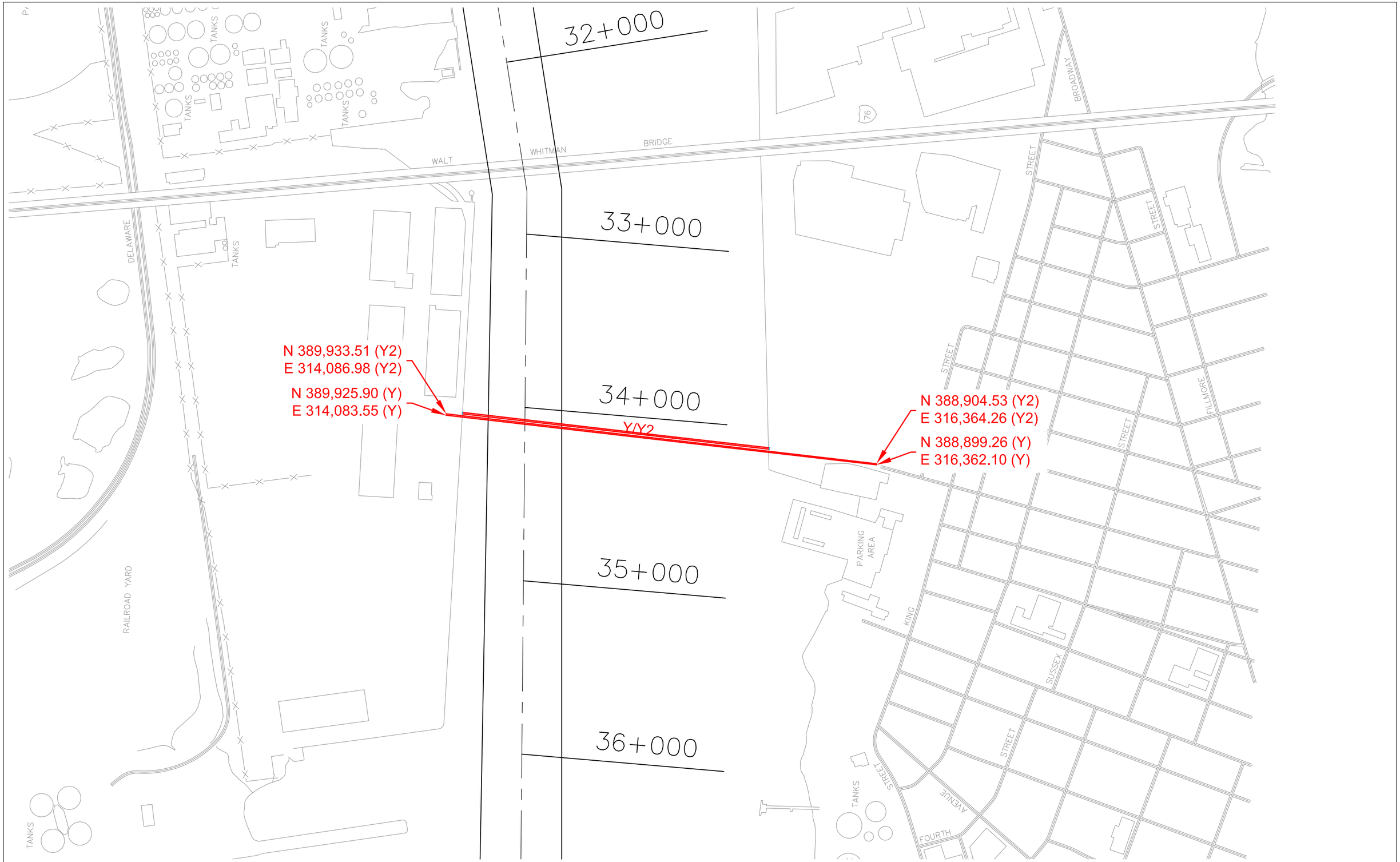


GBA ENGINEERS ★ SURVEYORS

REACH A UTILITY CROSSINGS

BUCKEYE (T), COLONIAL (U/U2), CONOCO (V), SUNOCO (W)

FIGURE 4B


32+000
33+000
34+000
35+000
36+000
Y/Y2
N 389,933.51 (Y2)
E 314,086.98 (Y2)
N 389,925.90 (Y)
E 314,083.55 (Y)
N 388,904.53 (Y2)
E 316,364.26 (Y2)
N 388,899.26 (Y)
E 316,362.10 (Y)
WALT WHITMAN BRIDGE
BROADWAY
DELAWARE
RAILROAD YARD
PARKING AREA
TANKS
STREET
AVENUE
FILLMORE
KING
SUSSEX
FOURTH
76

10.0 FINDINGS

Based on available records and the coordination undertaken with the owner/operators as part of this effort 15 submarine pipelines have been installed beneath the Delaware River shipping channel in Reach A (Stations 32+755 to 90+000). The earliest of these installations dates back to the early 1950s, with the latest in 2007. Findings for each of these submarine crossings are noted below and summarized in Table 3. The relevant permit conditions referenced in the last column of Table 3 are shown verbatim below the Table.

10.1 BUCKEYE PARTNERS, L.P. – UTILITIES O, O3, Q AND T

Utilities O & O3

- Corps permits were not available.
- As-built surveys were not available.
- All the information provided contained hydrographic surveys undertaken for the purpose of determining depth of cover over the utilities (see Appendix C).
- The utility depth shown seemed to be based upon that proposed for the permit application (design depth of -56 feet COE MLW across the channel), not actual installed depth.
- Conversion of the above design depth to the project datum equated to -56.2 feet MLLW.

Utility Q

- A Corps permit was not available.
- An as-built survey of utility Q was added to existing BPL Transportation; L.L.C. drawings (#s 0002A_s-242-1A thru G) on 4 June 2007 (see Appendix C).
- The vertical datum for the as-built survey was not stated.
- The as-built datum is 3.23 feet above the project datum (NOAA MLLW 1983-2001 Epoch).
- The minimum depth of the top of the pipeline in the Delaware River shipping channel as determined from the as-built drawing is 89.8 feet below the as-built survey datum.
- Conversion of the above minimum depth to the project datum equated to -86.6 feet MLLW.

Utility T

- Corps permit (No. NAPKA) was issued to the Laurel Pipe Line Company on 9 October 1957 to install a 24-inch diameter submarine pipeline across the Delaware River between the Philadelphia International Airport, Tinicum Township, Delaware County, PA, and a point opposite in West Deptford Township, Gloucester County, NJ (see Figure 5).
- An as-built survey was not available.

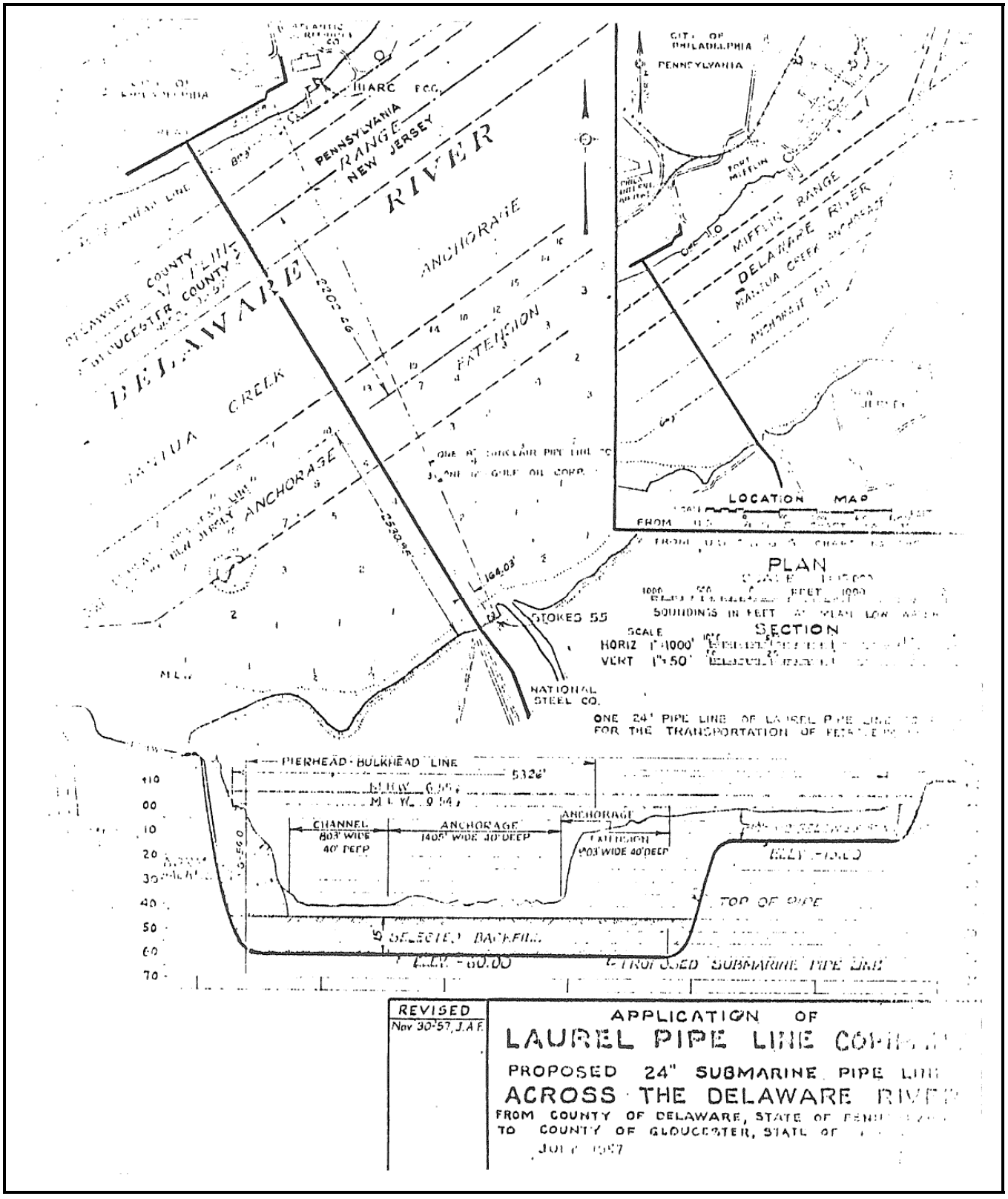


Figure 5 Permit Drawing of Buckeye Partners 24-inch Crossing (Utility T)

Utility T (continued)

- The information provided was a hydrographic survey undertaken for the purpose of determining depth of cover over the utility (see Appendix C).
- The vertical datum for the hydrographic survey is an assumed reference level (datum) unrelated to any tidal or geodetic datum.
- The utility design depth proposed in the Corps permit application was -60 feet DRD across the channel.
- Conversion of the above design depth to the project datum equated to -60.7 feet MLLW.

10.2 PBF Energy – Utility O2

Utility O2

- A Corps permit was not available.
- An as-built survey was not available.
- All the information provided contained hydrographic surveys undertaken for the purpose of determining depth of cover over the utility (see Appendix C).
- The utility depth shown appeared to be based upon that proposed for the permit application (design depth of -56 feet COE MLW across the channel), not the actual installed depth.
- Conversion of the above design depth to the project datum equated to -56.2 feet MLLW.

10.3 Sunoco Logistics Partners, L.P. – Utilities R and W

Utility R (directionally drilled bundle containing four pipelines)

- Corps permit (No. CENAP-OP-R-199400321-15) was issued to the Sun Pipe Line Company on 8 June 1994 construct a petroleum products pipeline from Paulsboro, Gloucester County, NJ, across and then along the Delaware River in Tinicum Township, Delaware County, PA, … to the Sun Refinery in Philadelphia, PA (see Figures 6 and 7).
- An as-built survey of utility R was added to existing Sun Pipe Line Company drawings (#s SP3-500 and SP3-501) on 22 December 1995 (see Appendix C).
- The vertical datum for the as-built survey was “NGVD 29”.
- The minimum depth of the top of pipe crossing the channel was -65 feet NGVD 1929.
- Conversion of the above minimum depth to the project datum equated to -62.8 feet MLLW.

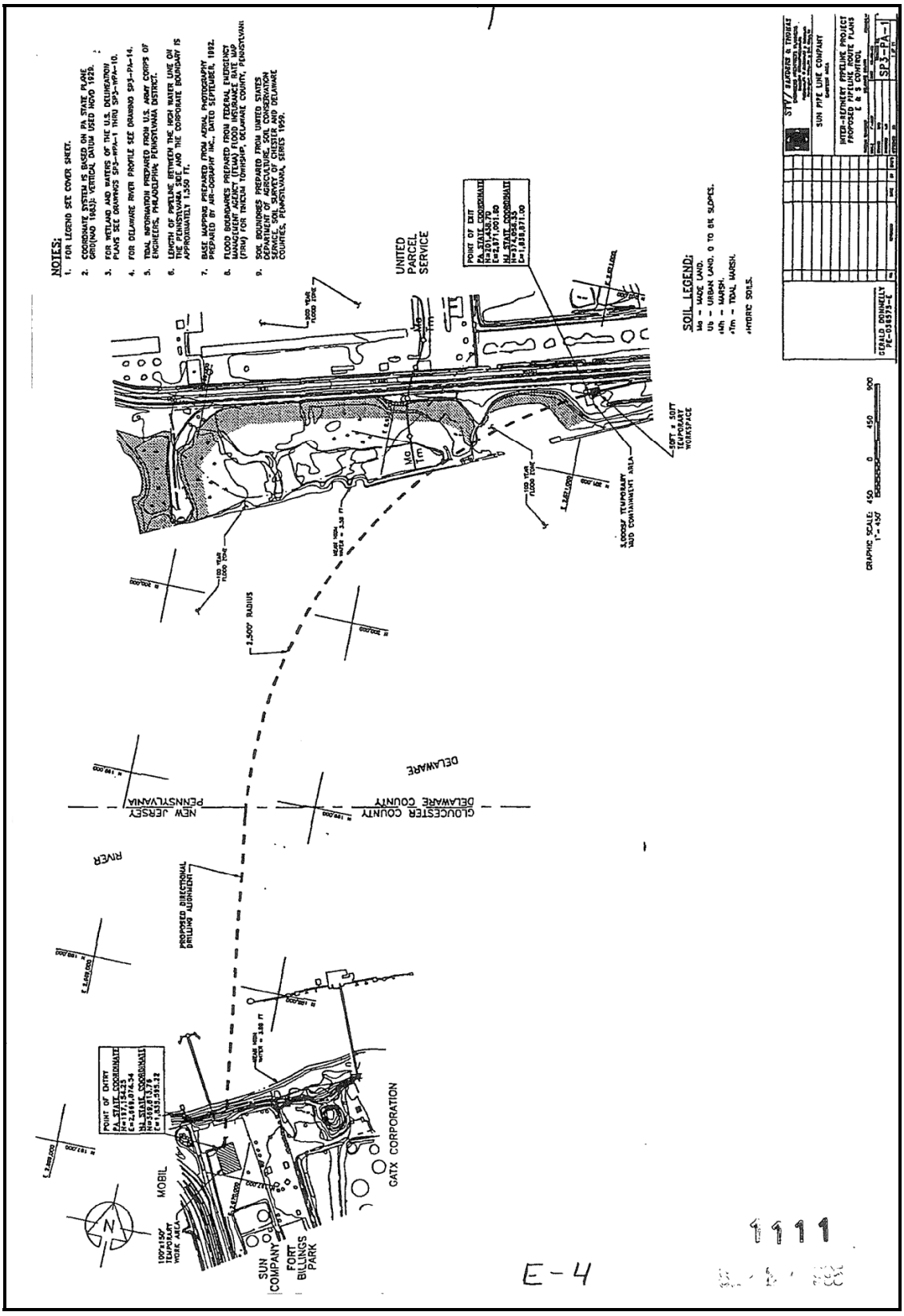


Figure 6 Permit Plan Drawing of Sunoco Logistics Directionally Drilled Crossing (Utility R)

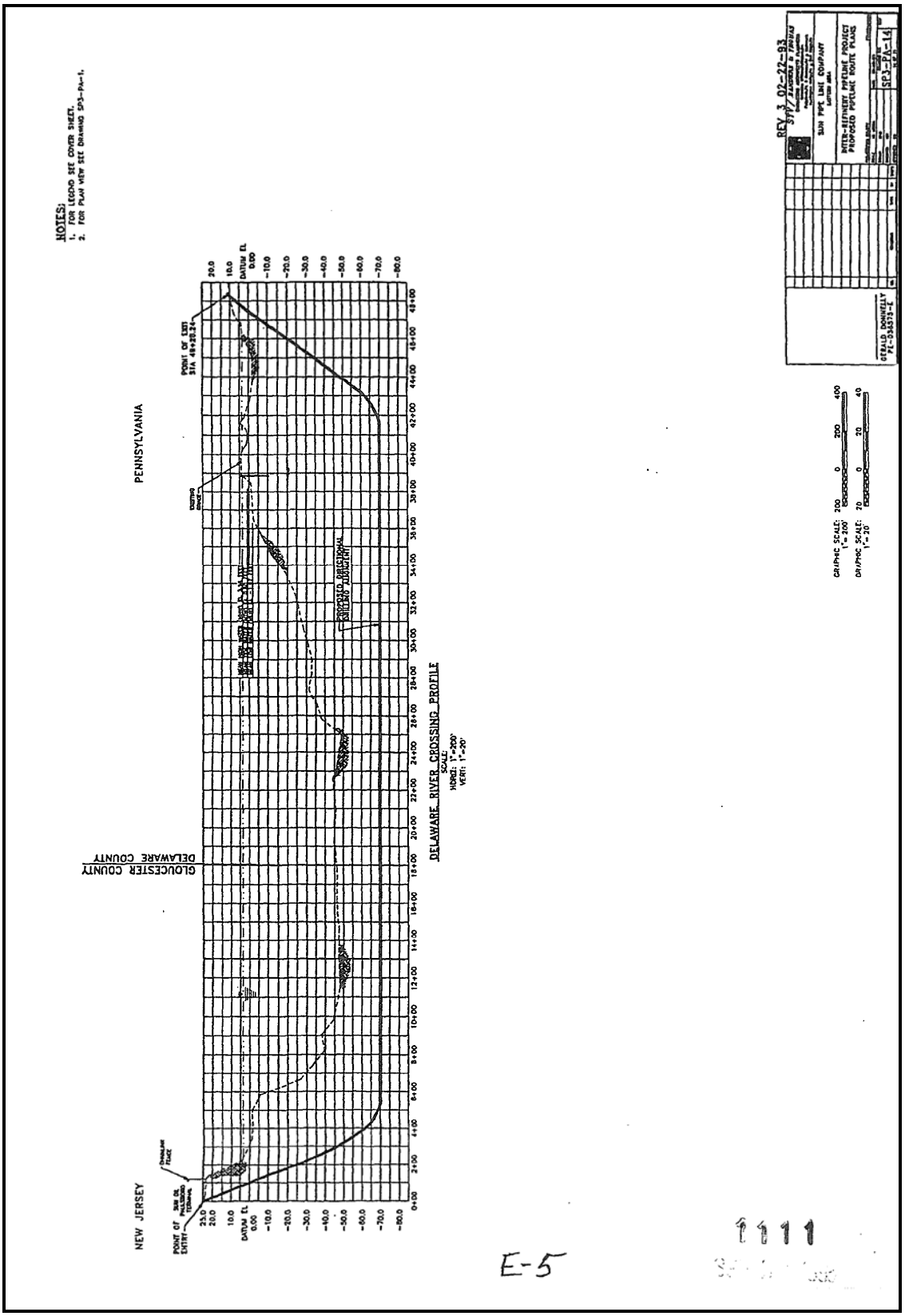


Figure 7 Permit Profile Drawing of Sunoco Logistics Directionally Drilled Crossing (Utility R)

Utility W

- A Corps permit was not available.
- An as-built survey was not available.
- The information provided consisted of documentation drawings, which were compiled from various reference drawings (see Appendix C).
- The depth of the top of pipeline crossing the channel was shown at a uniform -60 feet DRD.
- This appeared to be the design depth rather than an as-built depth, which would not exhibit such uniformity.
- Conversion of the above design depth to the project datum equated to -60.7 feet MLLW.
- A sub-bottom sonar survey of the pipeline crossing was conducted by Hudson Engineers for Sunoco Logistics on 26 April 2012.
- The purpose of the 26 April 2012 survey was to verify previously reported information related to the location and depth of this utility and Utility V, which lies in close proximity and is presumed to have been installed at the same time.
- The 26 April 2012 survey was referenced vertically and horizontally to MLLW and the NJ State Plane Coordinate system, respectively.
- As per the 26 April 2012 survey, the minimum depth of the top of pipe crossing the channel was shown as -53.4 feet MLLW (±2 feet).

10.4 Colonial Pipeline Company – Utilities U and U2

Utility U

- Corps permit No. NAPOP-N was issued to the Colonial Pipeline Company on 6 April 1964 to install a 10-inch diameter petroleum products pipeline across the Delaware River at the lower end of the Marcus Hook Anchorage, between Hog Island, Tinicum Township, Delaware County, PA and West Deptford Township, Gloucester County, NJ (see Figures 8 and 9).
- A scanned version of the as-built survey, conducted on 22 August 1964, was provided to GBA by Colonial (see Appendix C).
- The vertical datum used corresponded to the Delaware River Datum (DRD).
- The minimum depth of the top of pipe crossing the channel was -58.5 feet DRD.
- Conversion of the above minimum depth to the project datum equated to -59.2 feet MLLW.

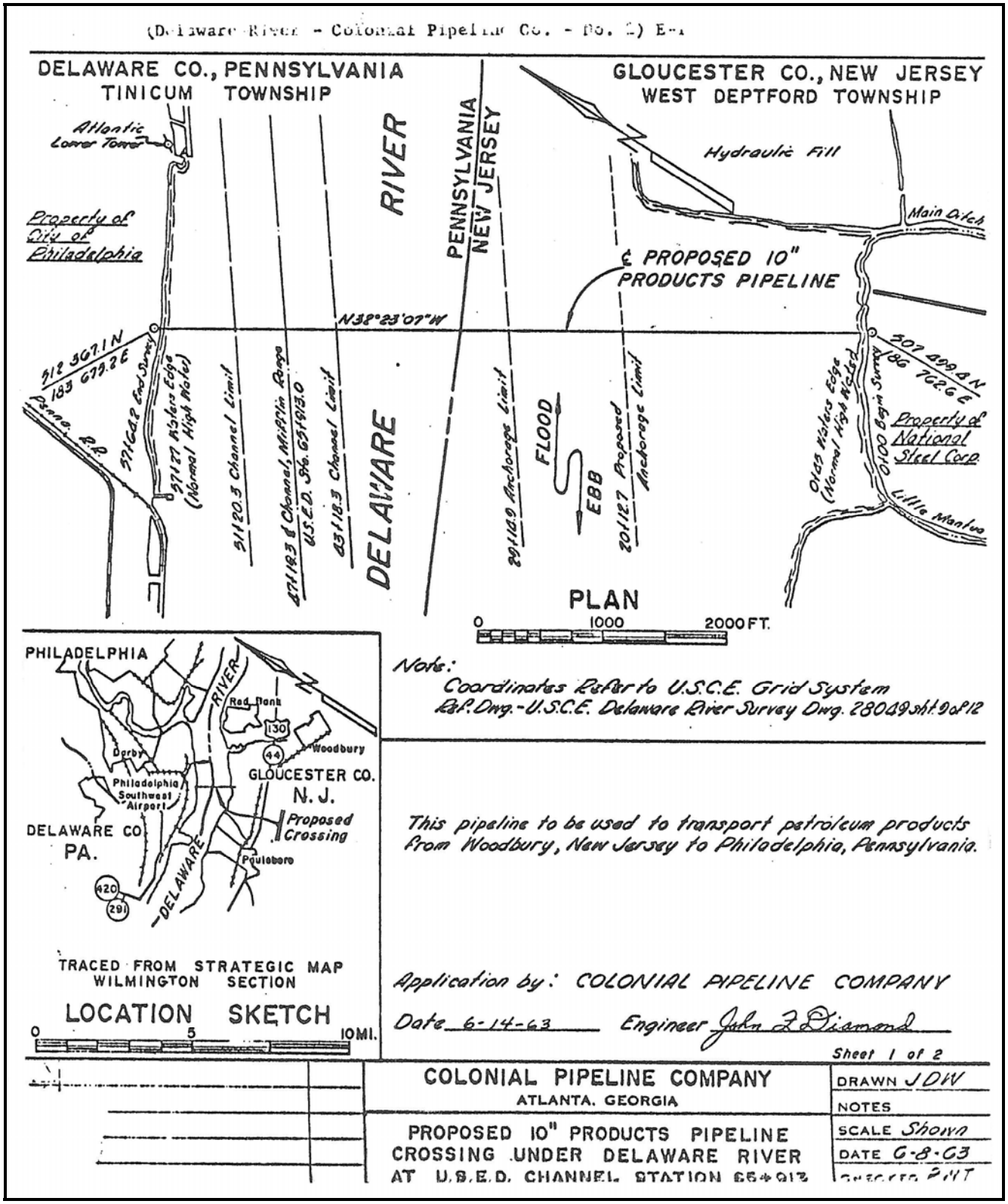


Figure 8 Permit Plan Drawing of Colonial Pipeline 10-inch Crossing (Utility U)

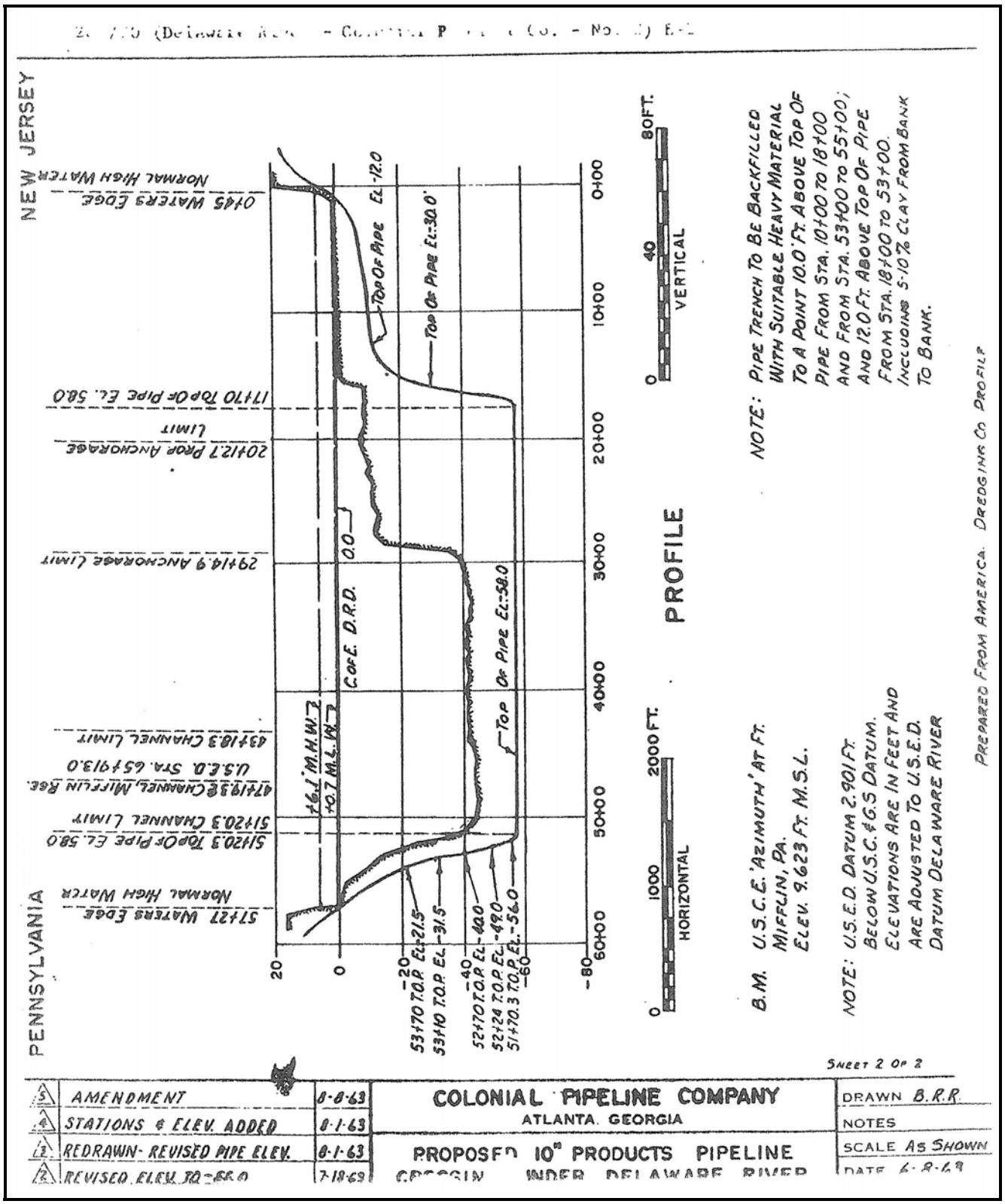


Figure 9 Permit Profile Drawing of Colonial Pipeline 10-inch Crossing (Utility U)

Utility U2

- A Corps permit was not available. A permit drawing dated 23 November 1964 was obtained showing the addition of a second 10-inch diameter pipeline (see Figures 10 and 11).
- A scanned version of the as-built survey, dated 2 September 1965, was provided to GBA by the Corps (see Appendix C).
- The vertical datum used corresponds to the Delaware River Datum (DRD).
- The minimum depth of the top of pipe crossing the channel was -58 feet DRD.
- Conversion of the above minimum depth to the project datum equated to -58.7 feet MLLW.

10.5 PHILLIPS 66 (FORMERLY CONOCOPHILLIPS - IN PROCESS OF BEING TRANSFERRED TO MONROE ENERGY, LLC) – UTILITY V

Utility V

- A Corps permit was not available.
- An as-built survey was not available.
- The information provided appeared to be a hydrographic survey undertaken for the purpose of determining depth of cover over the utility (see Appendix C).
- The Pipeline Inspection Report accompanying the survey (provided by Buckeye) indicated that the surveyors determine the top of pipeline through the “use of electronic instrumentation and follow that with manual probing to check the accuracy and validity of the electronics”, although a discussion of the actual procedures was absent from the report.
- The minimum depth of the top of pipeline crossing the channel as shown on the survey was -52feet MSL (the survey datum).
- Benchmark No. 1 (shown on the survey at +14.10 feet MSL) was recovered by GBA’s surveyor and determined to be at elevation +10.94 feet NAVD 88.
- Conversion of the above minimum depth of the top of pipeline to the recovered datum equates to -55.16 feet NAVD 88.
- Conversion of that depth to the project datum equated to -52.1 feet MLLW.
- A sub-bottom sonar survey of the pipeline crossing was conducted by Hudson Engineers for Sunoco Logistics on 26 April 2012.
- The purpose of the survey was to verify previously reported information related to the location and depth of this utility and Utility W, which lies in close proximity and is presumed to have been installed at the same time.
- The 26 April 2012 survey was referenced vertically and horizontally to MLLW and the NJ State Plane Coordinate system, respectively.
- As per the 26 April 2012 survey, the minimum depth of the top of pipe crossing the channel was shown as -53.4 feet MLLW.

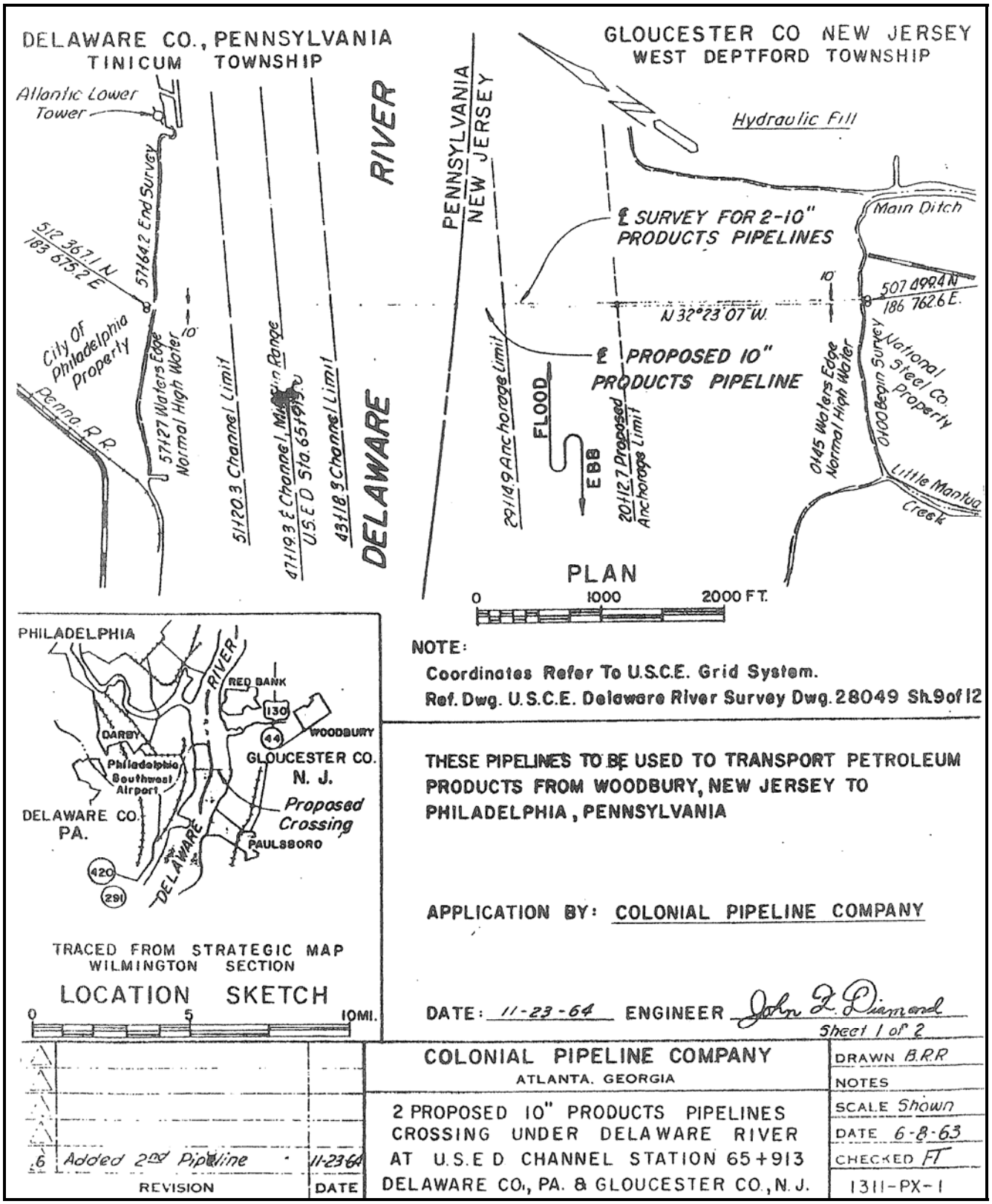


Figure 10 Permit Plan Drawing of Colonial Pipeline 10-inch Crossing (Utility U2)

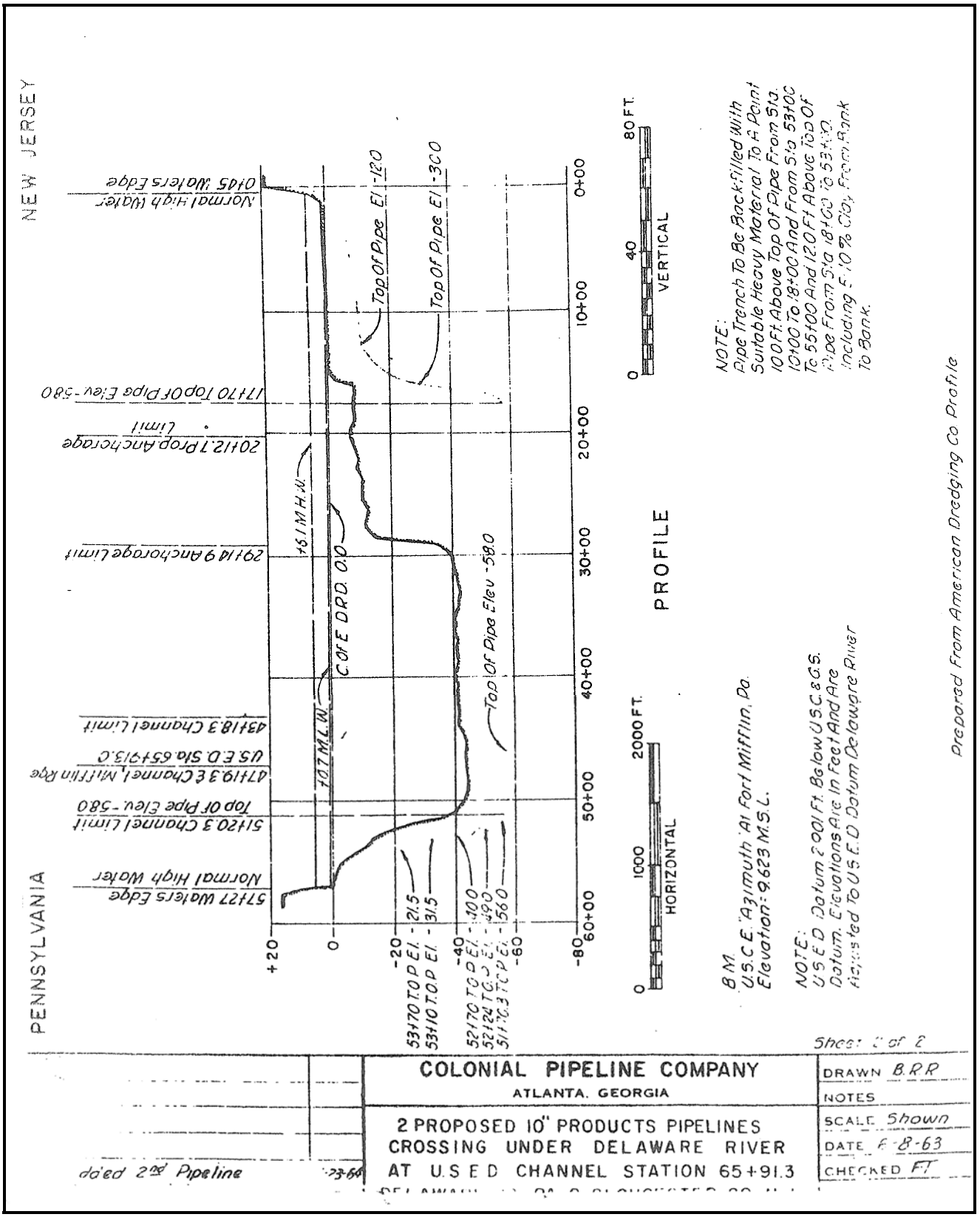


Figure 11 Permit Profile Drawing of Colonial Pipeline 10-inch Crossing (Utility U2)

10.6 WILLIAMS GAS PIPELINE TRANSCO – UTILITIES Y AND Y2

Utilities Y & Y2

- A Corps permit was not available.
- An as-built plan and profile (Drawing G-1966) was prepared by the Transcontinental Gas Pipe Line Corporation on 18 July 1963.
- The vertical datum for the as-built survey was “USC&GS Mean Sea Level”.
- A Datum Reference Graph on the drawing showed that MLW USED is 2.90 feet below this datum.
- This corresponded to the as-built datum being equivalent to National Geodetic Vertical Datum 1929 (NGVD 29).
- The minimum depth of the top of the pipelines crossing the channel was -69.2 feet NGVD 29.
- Conversion of the above minimum depth to the project datum equated to -67.0 feet MLLW.

Table 3 Delaware River Reach A Utility Crossings

Utility	*Owner/Operator*	*Contact Information*	*Utility Description*	*Permit Information*	*As-Built*	*West Bank Coordinates (Feet)*[1]	*Approximate Channel C/L Stationing*[2]	*East Bank Coordinates (Feet)*[1]	*Minimum Depth Below MLLW (Feet)*[3]	*Relevant Permit Conditions*
O	Buckeye Partners LP	Steve Wright 610-695-8015	One 10-inch pipeline (inactive)	Permit not available	No	N: 374308.00 E: 278481.79	77 + 800	N: 370158.25 E: 279184.69	56.2[4]	NA
O2	PBF Energy	Sam DeGeorge 856-224-4536	One 8-inch natural gas pipeline	Permit not available	No	N: 374305.13 E: 278488.30	77 + 800	N: 370171.00 E: 279183.67	56.2[4]	NA
O3	Buckeye Partners LP	Steve Wright 610-695-8015	One 8-inch jet fuel pipeline w/in a 12-inch casing	Permit not available	No	N: 374306.34 E: 278493.69	77 + 800	N: 370171.05 E: 279183.69	56.2[4]	NA
Q	Buckeye Partners LP	Steve Wright 610-695-8015	One 12-inch directionally drilled pipeline	Permit not available	Yes	N: 374308.00 E: 278481.79	77 + 600	N: 370324.04 E: 280409.81	86.6	NA
R	Sunoco Logistics Partners LP	James Franciscus 610-670-3309	One directionally drilled pipeline bundle w/one 6-inch and three 8-inch pipelines	Application submitted: NA Permit issued: 06/08/94 Permit #: CENAP-OP-R-199400321-15	Yes	N: 374390.01 E: 282244.92	76 + 000	N: 370247.88 E: 280904.05	62.8	General Condition #2 Special Condition #7
T	Buckeye Partners LP	Steve Wright 610-695-8015	One 24-inch product pipeline	Application submitted: 10/09/57 Permit #NAPKA issued: 03/25/58	No	N: 377652.45 E: 289097.43	65 + 800	N: 372664.92 E: 292098.96	60.7[4]	Permit Conditions (f) and (g)
U	Colonial Pipeline Company	Greg Herbstritt 856-381-4680	One 10-inch gas pipeline (inactive)	Application submitted: 06/14/63 Permit #NAPOP-N issued: 04/06/64	Yes	N: 377428.95 E: 288792.09	66 + 100	N: 372542.05 E: 291828.46	59.2	Permit Conditions (f) and (g)
U2	Colonial Pipeline Company	Greg Herbstritt 856-381-4680	One 10-inch gas pipeline	Permit drawing dated 11/23/64. Permit not available.	Yes	N: 377426.59 E: 288801.73	66 + 100	N: 372546.36 E: 291852.71	58.7	NA
V	Phillips 66 (formerly ConocoPhillips)[5]	Laura Schoenberger 832-486-3347	One 8-inch product pipeline	Initial construction permit not available Application to lower part of pipe submitted: 09/28/64 Permit #NAPOP-N issued: 02/09/65	No	N: 378171.86 E: 289863.06	65 + 000	N: 372785.40 E: 292290.30	53.4	Permit Conditions (f) and (g)
W	Sunoco Logistics Partners LP	James Franciscus 610-670-3309	One 12-inch product pipeline	Initial construction permit not available Application to lower part of pipe submitted: 09/28/64 Permit #NAPOP-N issued: 02/09/65	No	N: 378175.47 E: 289867.98	65 + 000	N: 372789.02 E: 292295.21	53.4	Permit Conditions (f) and (g)
Y	Williams Gas Pipeline/Transco	Richard Ricketts 609-936-2413	One 10-inch gas pipelines	Permit not available	Yes	N: 389925.90 E: 314083.55	34 + 100	N: 388899.26 E: 316362.10	67.0	NA
Y2	Williams Gas Pipeline/Transco	Richard Ricketts 609-936-2413	One 10-inch gas pipelines	Permit not available	Yes	N: 389933.51 E: 314086.98	34 + 100	N: 388904.53 E: 316364.26	67.0	NA

Notes:

[1] Coordinates are from survey of west (PA) and east (NJ) utility landings (see Appendix D) and are in New Jersey State Plane NAD 83.

[2] These are approximate channel centerline locations based on a projection of the of the onshore landing location surveys or, in the case of directionally drilled utility lines, a best fit of the as-built plan shape. The exact locations should be verified by the utility owner/operators.

[3] These depths are based upon information provided by the owner/operators of obtained from available records.

[4] Based on project design depth and not verified by post construction survey.

[5] Ownership in process of being transferred to Monroe Energy, LLC.

RELEVANT PERMIT CONDITIONS:

Utility

Q General Condition #2: *You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.*

Q Special Condition #6: Delaware River - *That the top of pipe elevation crossing the Federal Project Channel shall be located a minimum of 60 feet below Mean Low Water. In areas outside the Federal project channel, the top of pipe will be located a minimum of 10 feet below existing river bottom elevation.*

T Permit Condition (f) - *That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.*

T Permit Condition (g) - *That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or from other purposes, and no claim or right to compensation shall accrue from any such damage.*

U Permit Condition (f) - *Same as Permit Condition (f) above.*

U Permit Condition (g) - *Same as Permit Condition (g) above.*

V Permit Condition (f) - *Same as Permit Condition (f) above.*

V Permit Condition (g) - *Same as Permit Condition (g) above.*

W Permit Condition (f) - *Same as Permit Condition (f) above.*

W Permit Condition (g) - *Same as Permit Condition (g) above.*

11.0 CONCLUSIONS

Based on the information initially available, subsequent coordination with the owner/operators and a successive survey investigation undertaken jointly by two owner/operators, the conclusions reached for each of the submarine utility crossings identified in Table 2 are summarized below.

1) Buckeye Partners, L.P. (O, O3, Q & T)

- *Utility O*, an inactive 10-inch diameter petroleum products pipeline, crosses the Delaware River channel as shown in Figures 4 and 4A. The **design depth** of the pipeline, where it crosses the channel, is 56.2 feet below the project datum (NOAA MLLW 1983-2001 Epoch). The design depth is shown as the minimum depth of the top of pipeline, where it crosses the channel, but has not been verified by post construction survey.
- *Utility O3*, an 8-inch diameter natural gas pipeline, crosses the Delaware River channel as shown in Figures 4 and 4A. The **design depth** of the pipeline, where it crosses the channel, is 56.2 feet below the project datum (NOAA MLLW 1983-2001 Epoch). The design depth is shown as the minimum depth of the top of pipeline, where it crosses the channel, but has not been verified by post construction survey.
- *Utility Q,* a 12-inch diameter directionally drilled pipeline, crosses the Delaware River channel as shown in Figures 4 and 4A. The minimum depth of the top of pipeline, where it crosses the channel, is 86.6 feet below the project datum (NOAA MLLW 1983-2001 Epoch).
- *Utility T,* a 24-inch diameter petroleum products pipeline, crosses the Delaware River channel as shown in Figures 4 and 4B. The **design depth** of the pipeline, where it crosses the channel, is 60.7 feet below the project datum (NOAA MLLW 1983-2001 Epoch). The design depth is shown as the minimum depth of the top of pipeline, where it crosses the channel, but has not been verified by post construction survey.

2) PBF Energy (O2)

- *Utility O2,* an 8-inch diameter jet fuel pipeline within a 12-inch casing, crosses the Delaware River channel as shown in Figures 4 and 4A. The **design depth** of the pipeline, where it crosses the channel, is 56.2 feet below the project datum (NOAA MLLW 1983-2001 Epoch). The design depth is shown as the minimum depth of the top of pipeline, where it crosses the channel, but has not been verified by post construction survey.

3) Sunoco Logistics Partners, L.P. (R & W)

- *Utility R*, a directionally drilled bundle consisting of one 6-inch and three 8-inch diameter pipelines, crosses the Delaware River channel within the crossing envelope as shown in Figures 4 and 4A. The minimum depth of the top of the pipeline bundle, where it crosses the channel, is 62.8 feet below the project datum (NOAA MLLW 1983-2001 Epoch).
- *Utility W*, a 12-inch diameter pipeline, crosses the Delaware River as shown in Figures 4 and 4B. The minimum depth of the top of pipeline, where it crosses the channel, is 53.4 feet (± 2 feet) below the project datum (NOAA MLLW 1983-2001 Epoch).

4) Colonial Pipeline Company (U & U2)

- Utility U, an inactive 10-inch diameter gas pipeline, crosses the Delaware River as shown in Figures 4 and 4B. The minimum depth of the top of pipeline, where it crosses the channel, is 59.2 feet below the project datum (NOAA MLLW 1983-2001 Epoch).
- *Utility U2*, a 10-inch diameter gas pipeline, crosses the Delaware River as shown in Figures 4 and 4B. The minimum depth of the top of pipeline, where it crosses the channel, is 58.7 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

5) Phillips 66 (formerly ConocoPhillips) (V)

- *Utility V,* an 8-inch diameter pipeline, crosses the Delaware River as shown in Figures 4 and 4B. The minimum depth of the top of pipeline, where it crosses the channel, is 53.4 feet (± 2 feet) below the project datum (NOAA MLLW 1983-2001 Epoch).

6) Williams Gas Pipeline/Transco (Y & Y2)

- *Utilities Y and Y2,* two 10-inch diameter gas pipelines, cross the Delaware River as shown in Figures 4 and 4C. The minimum depth of the top of the pipelines, where they cross the channel, is 67.0 feet below the project datum (NOAA MLLW 1983-2001 Epoch).

12.0 RECOMMENDATIONS FOR FURTHER ACTION

It was noted previously that as-built drawings for several utilities (O, O2, O3, T, V and W) were not available. The current owner/operators cited the many ownership changes over the last six decades since the submarine utility lines had been constructed as the reason for not possessing that information. Subsequent to GBA's information requests two of the owners (Sunoco Logistics and Phillips 66/formerly ConocoPhillips) decided to contract for sub-bottom sonar surveys of their submarine utility lines (W and V, respectively) to provide them with more accurate location information. Although as-built surveys were available for their utility lines (U and U2), Colonial Pipeline decided to supplement that information and are conducting sonar surveys on those lines as well as two utility lines in Reach B.

1. ***Buckeye Partners, L.P.*** **–** Buckeye should be encouraged to conduct similar investigations of their utility lines (O, O3 and T), which currently lack any as-built information.
2. ***PBF Energy*** **–** PBF Energy should be encouraged to conduct a similar investigation of their utility line (O2), which currently lacks any as-built information.

Since utility lines O, O2 and O3 all cross in close proximity to each other, it may be advantageous for these lines to be surveyed concurrently to minimize the cost.

It is generally recommended that coordination with all owner/operators be undertaken prior to the actual dredging. A meeting(s) should be held with the selected dredging contractor and all owner/operators to go over the dredging plan for sediment removal in Reach A prior to the initiation of dredging.

APPENDIX A

Special Permit Conditions

Special Permit Conditions

.1 Relevant Special Permit Conditions for Cables effective September 21, 2006 (extracted from comprehensive list provided by Corps)

CABLE 3
That within 60 days after completion of the work, the permittee shall furnish the Corps and National Oceanic and Atmospheric Administration, Nautical Data Branch, N/CS 26, Station 7230, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, with certification that the cable has been installed in compliance with the approved plans. The certification shall include a survey, conducted by a licensed surveyor, which clearly shows the elevations and alignment of the cable across the waterway. Any discrepancies shall be clearly noted.

CABLE 4
That turbidity controls in the form of silt curtains or similar type material shall be installed downstream from the cable crossings and shall remain in place during all excavation and restoration operations.

CABLE 5
***DELAWARE RIVER AND SCHUYLKILL RIVER *** That the top of cable elevation crossing the Federal project channel shall be located a minimum of 20 feet below the authorized project channel depth and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation. In areas outside the Federal project channel, the top of cable shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.

CABLE 7
That there shall be no stockpiling or double handling of any excavated/dredged materials within any waterway and/or wetland areas.

CABLE 8
That all excess dredged or excavated material not used as backfill shall be disposed at a separately approved disposal site.

CABLE 9
That only clean, inorganic, heavy material shall be used as backfill over the cable. This material shall be of such size that no more than 10% of it shall pass through a #100 sieve.

CABLE 10
That construction of the cable crossing will not interfere with safe navigation in the waterway. All construction work/procedures shall be coordinated with the U.S. Coast Guard and shall be subject of a Notice to Mariners issued by the U.S. Coast Guard. The District Engineer shall be provided with a copy of the construction procedures/schedule for cable crossing construction.

CABLE 11
FEDERAL NAVIGATION PROJECT CHANNELS That material excavated from the cable trench (by bucket method) outside of the Federal project channel shall be either stockpiled on a barge or sidecast next to the trench in such a manner as to not interfere with safe navigation to the area. That material excavated (by bucket method) from the cable trench within the Federal project channel shall be stockpiled on a barge or at a separately approved upland disposal site.

CABLE 12
That all unsuitable/excess dredged and excavated material not used as backfill over the cable shall be removed from the river bottom and disposed of at a separately approved upland disposal site.

CABLE 13
That all dredging/backfilling operations shall be performed in a manner that minimizes turbidity.

A.2. Relevant Special Permit Conditions for Pipelines effective September 21, 2006 (extracted from comprehensive list provided by Corps)

PIPE 1
That only clean, inorganic, heavy material shall be used as backfill over the pipeline. This material shall be of such size that no more than 10% of it shall pass through a #100 sieve.

PIPE 3
That construction of the pipeline will not interfere with safe navigation in the waterway. All construction work/procedures shall be coordinated with the U.S. Coast Guard and shall be subject of a Notice to Mariners issued by the U.S. Coast Guard. The District Engineer shall be provided with a copy of the construction procedures/schedule for pipeline installation.

PIPE 4
DELAWARE AND SCHUYLKILL RIVERS That the top of pipe elevation crossing the Federal project channel shall be located a minimum of 20 feet below authorized project channel depth and shall be backfilled with suitable heavy materials to the adjacent river bottom elevation. In areas outside the Federal project channel, the top of pipe shall be located a minimum of 10 feet below existing river bottom elevation and shall be backfilled with suitable material to the adjacent river bottom elevation.

PIPE 5
FEDERAL NAVIGATION PROJECT CHANNELS That material excavated from the pipeline trench (by bucket method) outside of the Federal project channel shall be either stockpiled on a barge or sidecast next to the trench in such a manner as to not interfere with safe navigation to the area. That material excavated (by bucket method) from the pipeline trench within the Federal project channel shall be stockpiled on a barge or at a separately approved upland disposal site.

PIPE 6
That all unsuitable/excess dredged and excavated material not used as backfill over the pipeline shall be removed from the river bottom and disposed of at a separately approved upland disposal site.

PIPE 7
That all dredging/backfilling operations shall be performed in a manner that minimizes turbidity.

PIPE 9
That there shall be no stockpiling or double handling of any excavated/dredged materials within any waterway and/or wetland areas.

PIPE 10
That all excess dredged or excavated material not used as backfill, shall be disposed at a separately approved disposal site.

PIPE 11
That any material generated during the excavation for the pipe shall be removed from areas adjacent to the river so that it is not eroded into the waterway.

PIPE 12
That operation of equipment shall not occur on wetland vegetation outside of the designated rights-of-way. All excavated material from pipeline trench shall be stockpiled on a non-wetland site. When it is necessary to place excavated material on wetlands, the excavated materials shall be removed subsequent to backfilling of the trench, and the areas restored to pre-construction condition.

PIPE 13
That the permittee shall provide detailed construction methods to be used for installation of the pipeline. This should include equipment to be used, construction sequence, method of excavation, disposal sites, placement of temporary or permanent fill, etc.

PIPE 14
That prior to construction, silt curtains or a similar type turbidity control device shall be placed upstream and downstream of the pipeline construction area.

PIPE/FED
That upon completion of the work, the permittee shall furnish the Corps and National Oceanic and Atmospheric Administration, Nautical Data Branch, N/CS 26, Station 7230, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, with certification that the pipeline has been installed in Compliance with the approved plans. The certification shall include a survey, conducted by a licensed surveyor, which clearly shows the elevation of the top of the pipeline and its alignment across the waterway. Any discrepancies shall be clearly identified/noted.

APPENDIX B

As-Built Vertical Datum Review

As-Built Vertical Datum Review

INTRODUCTION

In order to compare the design and as-built drawings, the data needs to be referenced to the same vertical datum and horizontal grid. Variations in this information can be attributed to the established datum and grid system at the time that the design or as-built survey was performed.

The Corps and NOAA currently utilize NOAA MLLW feet (1983-2001 Epoch) as the vertical datum and the NJ State Plane NAD 83 horizontal datum for projects in the Delaware River and Bay.

VERTICAL DATUM CONVERSION

NOAA MLLW has been established as the vertical datum for the Delaware River Main Channel Deepening Project. The design drawings and as-built surveys available for the identified submarine utility crossings used different vertical datums. As such, there was a need to convert those datums to NOAA MLLW.

Figure B-1 depicts the relationships of the various tidal and geodetic datums, such as NGVD 29, NAVD 88 and COE DRD, to the project datum (NOAA MLLW) in the vicinity of the three clusters of utility crossings in Reach A. These relationships were applied to the available design and as-built data in order to reference it to the project datum.

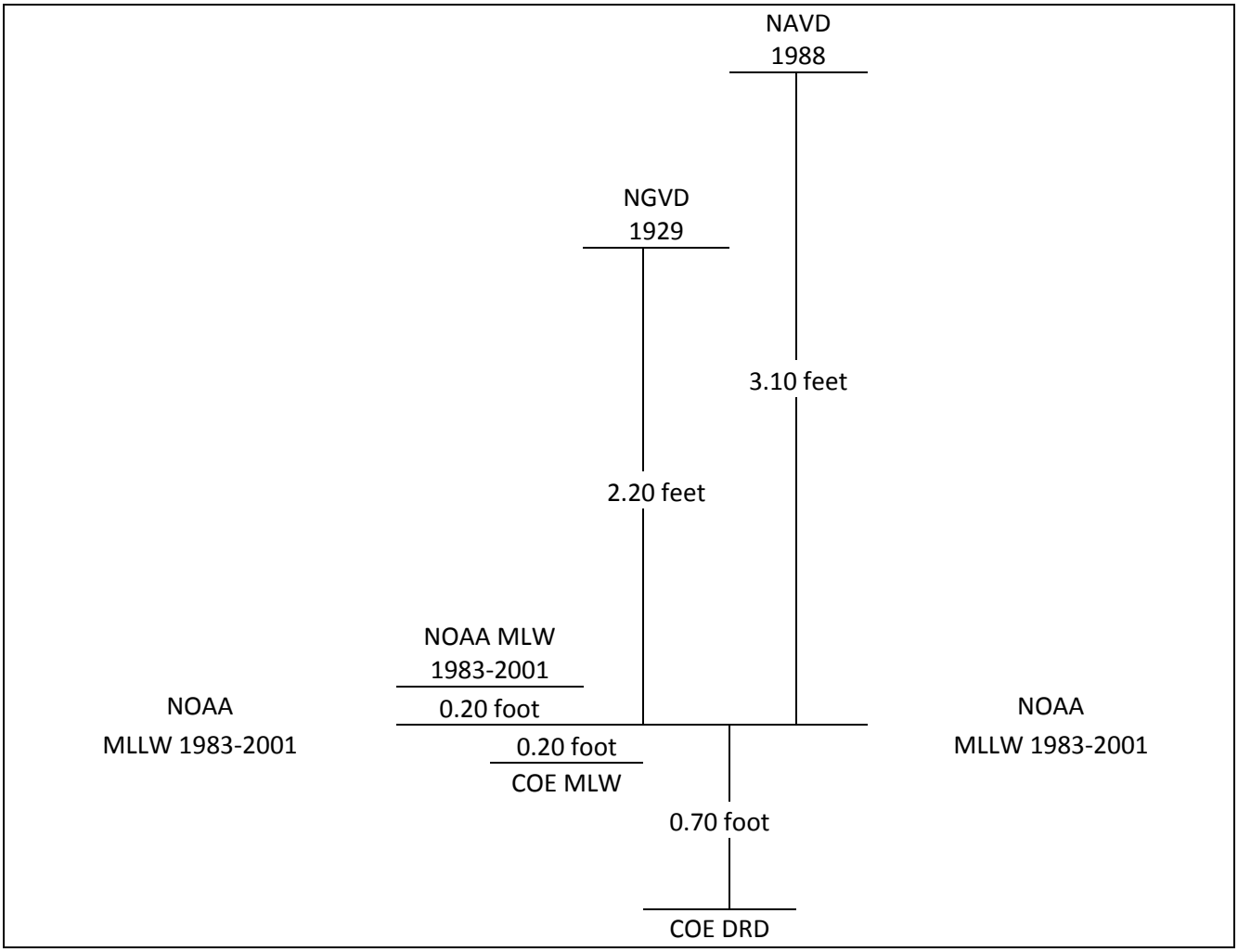


Figure B-1 Vertical Datum Conversions - Reach A

Notes:

1) *The above conversions are only applicable in the vicinity of the utility crossings in Reach A.*
2) *The correction factor between NAVD 88 and NOAA MLLW ranges from 3.03 feet to 3.23 feet within the study area. For the three ranges containing submarine utility crossings – Billingsport, Mifflin and "M" – the correction factors are 3.05 feet, 3.06 feet and 3.10 feet, respectively.*
3) *A conservative correction factor of 3.10 feet was used above as a variation of 0.05 foot is considered negligible for the purposes of this investigation.*

As-Built Vertical Datum Review

The following information was available from the Corps of Engineers and subsequent coordination with the owner/operators regarding design drawings or as-built surveys for each of the identified submarine crossings crossing the Delaware River shipping channel, and the assumptions and conversions that were applied to convert to the NOAA MLLW project datum.

1. Buckeye Partners, L.P. - Utilities O and O3

- As-Built Drawings - Unavailable
- Design Drawings - Unavailable
- Year Constructed - Prior to 1960
- Referenced Design Datum - MLW

The referenced design datum of MLW is assumed to be COE MLW. Based upon this assumption, the proposed design depth of 56.0 feet below MLW was determined to be 56.2 feet below the project datum.

2. Buckeye Partners, L.P. - Utility Q

- As-Built Drawing - 4 April 2007
- Referenced Datum - Independent (MLLW -3.23 feet)

The vertical datum statement on the drawing states 0 is 3.23 feet above MLLW. It does not state the specific datum reference by name. As the datum was not labeled, it is stated as to be an “Independent Datum”. It is assumed that the MLLW referenced on the survey is NOAA MLLW. Based upon this assumption, the minimum as-built depth of 89.8 feet below the as-built datum was determined to be 86.6 feet below the project datum.

3. Buckeye Partners, L.P. - Utility T

- As-Built Drawing - Unavailable
- Design Drawing - 30 November 1957
- Referenced Design Datum - COE DRD

The referenced design datum on the permit drawing is COE DRD (Delaware River Datum). Based upon this information, the proposed design depth of 60.0 feet below DRD was determined to be 60.7 feet below the project datum.

4. PBF Energy - Utility O2

- As-Built Drawing - Unavailable
- Design Drawing - Unavailable
- Year Constructed - Prior to 1960
- Referenced Design Datum - MLW

See comments above for Buckeye Partners, LP - Utilities O and O3.

5. Sunoco Logistics Partners, L.P. - Utility R

- As-Built Drawing - 22 December 1995
- Referenced Datum – NGVD 29

The referenced design datum on the permit drawing is NGVD 29. Based upon this information, the minimum as-built depth of 65.0 feet below NGVD 29 was determined to be 62.8 feet below the project datum.

6. Sunoco Logistics Partners, L.P. - Utility W

- As-Built Drawing - Unavailable
- Design Drawing - Unavailable
- Sub-bottom Sonar Survey - 26 April 2012
- Referenced Datum – MLLW

The vertical datum used for the sub-bottom sonar survey was the same as the project datum - NOAA MLLW. The minimum depth shown on the sub-bottom was determined to be 53.4 feet below the project datum.

7. Colonial Pipeline Company - Utility U

- As-Built Drawing - 22 August 1964
- Referenced Datum - COE DRD

The referenced datum on the as-built drawing is COE DRD (Delaware River Datum). Based upon this information, the minimum as-built depth of 58.5 feet below DRD was determined to be 59.2 feet below the project datum.

8. Colonial Pipeline Company - Utility U2

- As-Built Drawing - 2 September 1965
- Referenced Datum - COE DRD

The referenced datum on the as-built drawing is COE DRD (Delaware River Datum). Based upon this information, the minimum as-built depth of 58.0 feet below DRD was determined to be 58.7 feet below the project datum.

9. Phillips 66 (formerly ConocoPhillips) - Utility V

- As-Built Drawing - Unavailable
- Design Drawing - Unavailable
- Sub-bottom Sonar Survey - 26 April 2012
- Referenced Datum – MLLW

See comments above for Sunoco Logistics Partners, L.P. - Utility W.

10. Williams Gas Pipeline Transco - Utilities Y and Y2

- As-Built Drawing - 18 July 1963
- Referenced Datum - MSL USC&GS

The referenced datum on the as-built drawing is MSL USC&GS. A Datum Reference Graph on the drawing states that MLW USED is 2.90 feet below the referenced datum (MSL). For this time period it is assumed that MLW USED is synonymous with COE DRD. This would mean the as-built datum is the same as NGVD 29. Based upon this assumption, the proposed design depth of 69.2 feet below NGVD 29 was determined to be 67.0 feet below the project datum.

RESULTS

Based on the above, a summary table (Table B-1) is provided on the following page. The table shows the reference datums used for the various available survey drawings and the minimum depth of the utility crossing in the channel referenced to both the survey datum used and as adjusted to the project datum.

TABLE B-1
REACH A SUBMARINE UTILITY CROSSINGS OF THE DELAWARE RIVER
As-Built Survey[2]/Project Vertical Datum Information

Current Owner/Operator	Utility Description	Location	Date of Survey[2]	Minimum Below Survey Datum In Channel (feet)	Survey Datum Description	Minimum Below Project Datum (NOAA MLLW) In Channel (feet)
Buckeye Partners (O)	1-10 inch pipeline (inactive)	Billingsport Range	Various[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
PBF Energy (O2)	1-8 inch natural gas pipeline	Billingsport Range	05/10/11[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
Buckeye Partners (O3)	1-8 inch jet fuel pipeline w/in 12 inch casing	Billingsport Range	Various[3]	56.0	"MLW" (presumed to be COE MLW)	56.2[6]
Buckeye Partners (Q)	1-12 inch directionally drilled pipeline	Billingsport Range	06/04/07	89.8	"Independent Datum" (MLLW -3.23' below datum)	86.6
Sunoco Logistics (R)	1-directionally drilled pipeline bundle (1-6 inch and 3-8 inch pipelines)	Billingsport Range	12/05/94	65.0	"NGVD 1929" (MHW +3.58', MLW -1.97')	62.8
Buckeye Partners (T)	1-24 inch product pipeline	Mifflin Range	10/09/57[4]	60.0	"DRD" (MHW +6.2', MLW +0.54')	60.7[6]
Colonial Pipeline (U)	1-10 inch gas pipeline (inactive)	Mifflin Range	08/22/64	58.5	"DRD" (MLW +0.54')	59.2
Colonial Pipeline (U2)	1-10 inch gas pipeline	Mifflin Range	09/02/65	58.0	"DRD" (MHW +6.2', MLW +0.54')	58.7
Phillips 66 (V)[1]	1-8 inch pipeline	Mifflin Range	04/26/12[5]	53.4	"MLLW" (NAVD 88 +3.2')	53.4[7]
Sunoco Logistics (W)	1-12 inch pipeline	Mifflin Range	04/26/12[5]	53.4	"MLLW" (NAVD 88 +3.2')	53.4[7]
Williams GP/Transco (Y & Y2)	2-10 inch gas pipelines	"M" Range	07/18/63	69.2	"MSL USC&GS Datum" (MHW-U.S.E.D. +3.37', MLW-U.S.E.D. -2.90', presumed to be NGVD 29)	67.0

Notes

[1] *Formerly ConocoPhillips and currently in process of being transferred to Monroe Energy, LLC.*

[2] *As-built surveys unless otherwise noted.*

[3] *Not from an as-built survey - information from hydro surveys made to check sediment cover over pipeline, which showed pipe depths based on permit drawings.*

[4] *Not from an as-built survey - proposed pipe depth from permit drawing.*

[5] *Not from an as-built survey - information from sub-bottom sonar survey conducted to confirm location and depth of pipeline.*

[6] *Based on project design depth and not verified by post construction survey.*

[7] *Survey report recommends a 2-foot ± tolerance for pipeline depths determined by the survey.*

APPENDIX C

Letters & Attachments to Owner/Operators with Responses*

It should be noted that any discrepancies between Appendix C and other sections of this report regarding utility depth and landside coordinate information are due to earlier source data being superseded by more reliable data. The reader is directed to Tables 2 and 3, and Figures 4, 4A, 4B and 4C for GBA's best representation of utility depths and landside coordinates based on the most recently available information.

BUCKEYE PARTNERS, LP

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 11, 2012

Steven L. Wright
Operations Manager
Buckeye Partners, L.P.
8 South Malin Road
Malvern, PA 19355

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Wright:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

You were initially contacted by me on November 14, 2011, to request information about known crossings within Reaches A-A and A. We met on November 22, 2011, where you identified four utility lines (one directionally drilled 12" pipeline, one inactive 10" pipeline, one 8" jet fuel pipeline within a 12" casing and one 24" pipeline) operated by Buckeye Partners crossing the Delaware River within Reach A.

The as-built drawing we have for the directionally drilled 12" pipeline crossing the channel at approximately Channel Station 77+500 is attached. A review of the drawing shows:

- The vertical datum on the drawing is an independent datum and shows MLLW at 3.23' below the datum.
- The minimum depth of the top of pipe crossing the channel appears to be 89.8' below the drawing datum
- Conversion of the above depth to the project datum equates to -86.6' MLLW.

On January 23, 2012, I requested supplemental information from you to more accurately identify the location and depth of the 10", 8" and 24" pipeline crossings.

Attached is the information GBA currently has for the 10" and 8" pipelines operated by Buckeye Partners and crossing the channel at approximately Channel Station 77+960. A review of the information for these pipelines prompts the following observations, questions and/or concerns:

- All the information provided appears to be hydrographic surveys undertaken for the purpose of determining depth of cover over the utility.
- The utility depth shown appears to be based upon that proposed in the permit application (-56' COE MLW across the channel), not actual installed depth.
- Conversion of the above to the project datum equates to -56.2' MLLW.
- No as-built drawing has been provided.

Also attached is the information GBA currently has for the 24" pipeline operated by Buckeye Partners and crossing the channel at approximately Channel Station 65+780. A review of the information for this pipeline prompts the following observations, questions and/or concerns:

- The information provided appears to be a hydrographic survey undertaken for the purpose of determining depth of cover over the utility.
- The vertical datum for the survey is an assumed datum unrelated to any tidal or geodetic datum.
- The utility depth proposed in the permit application was -60' DRD across the channel.
- Conversion of the above to the project datum equates to -60.9' MLLW.
- No as-built drawing has been provided.

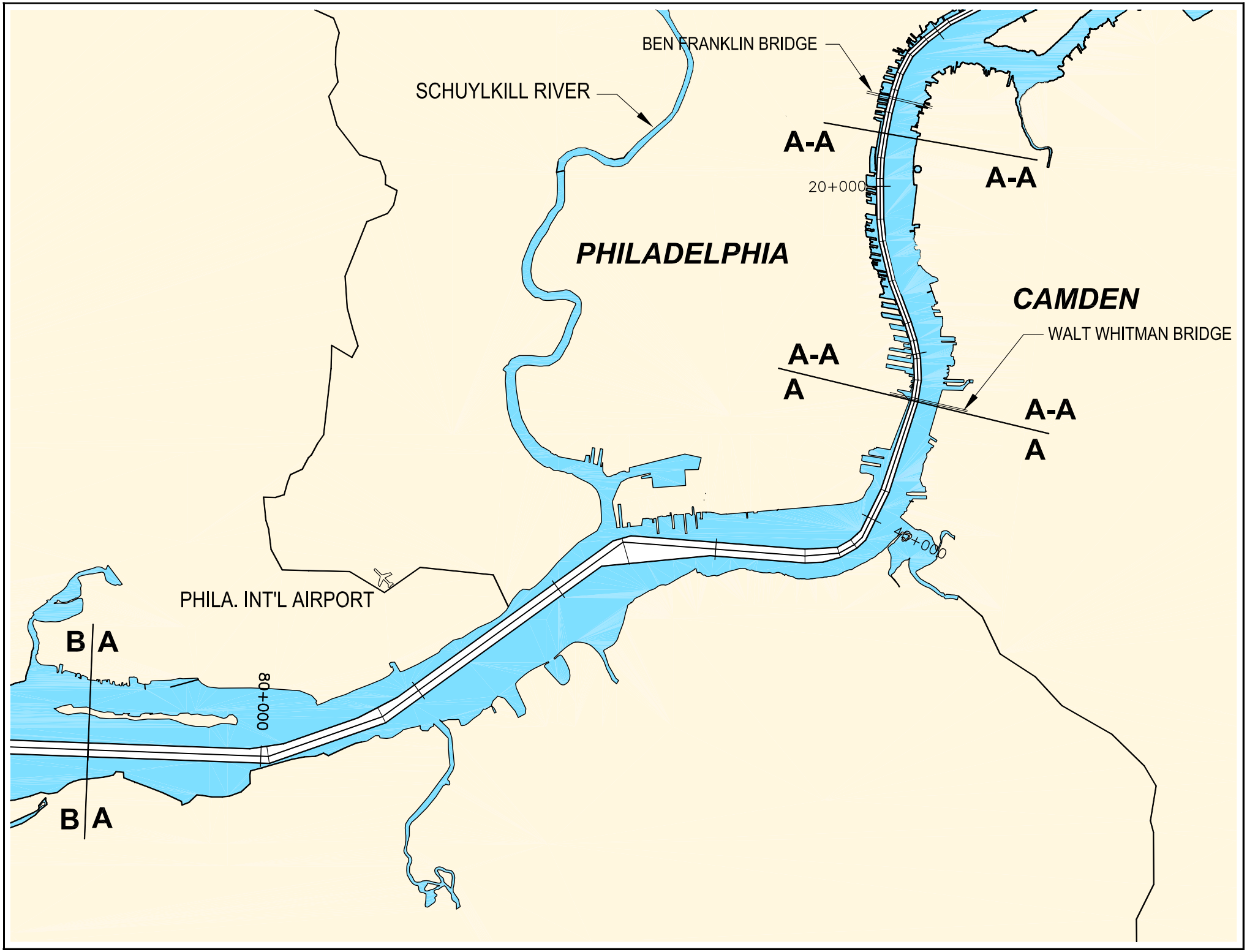
If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information referenced above properly documents the status and location of the utilities. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

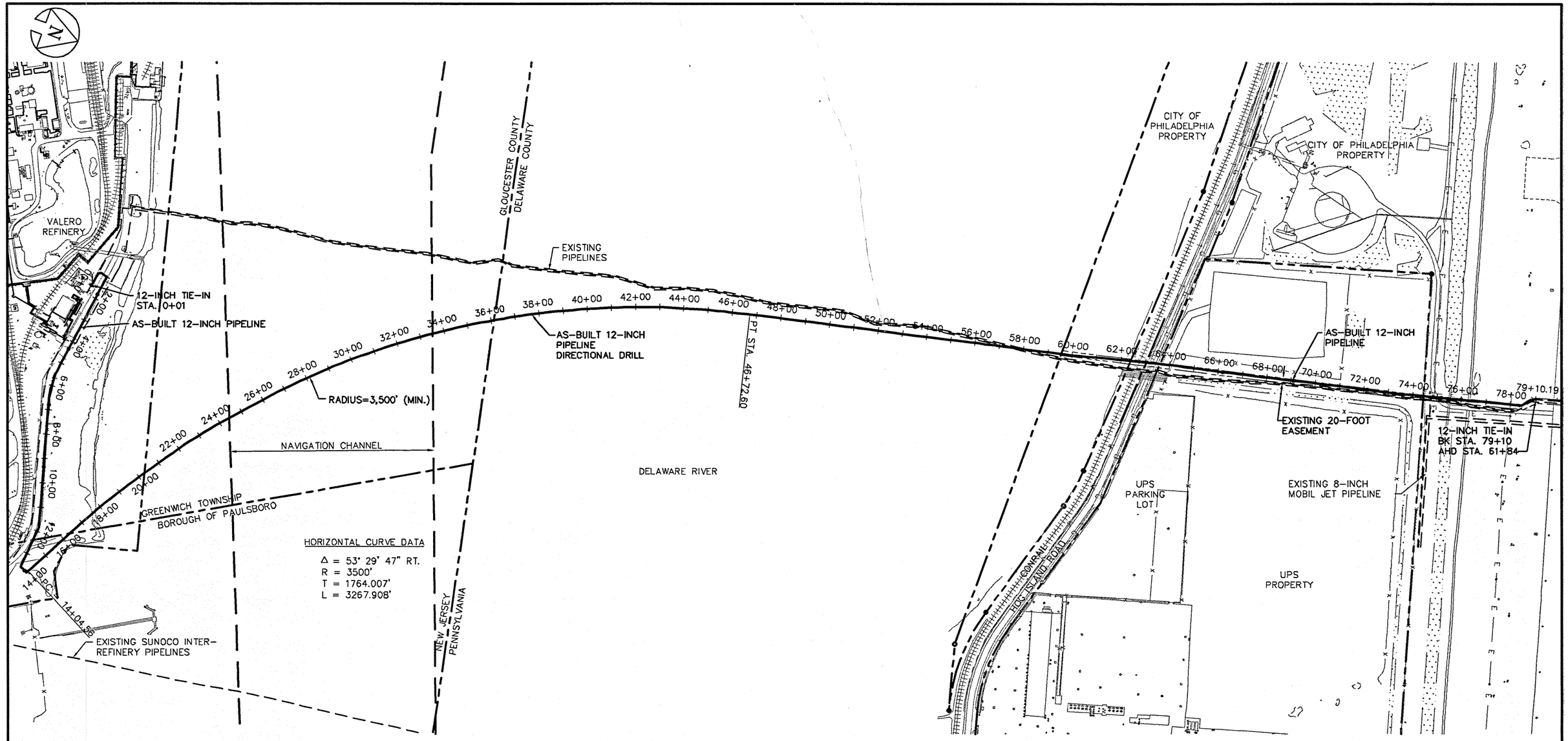
Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

BUCKEYE PARTNERS, LP (Q)

Utility Q – 12” Directionally Drilled Pipeline
As-Built Drawings



PLAN

LEGEND:

- PROPERTY LINE
- PIPELINE RIGHT-OF-WAY
- AS-BUILT PIPELINE
- EXISTING PIPELINE
- 80 CONTOUR
- BRUSH LINE
- S STORM SEWER
- E ELECTRIC
- G GAS
- T TELEPHONE
- W WATER LINE
- FENCE
- GUIDERAIL
- ROAD
- WETLANDS

ExxonMobil Pipeline Company
ENGINEERING SERVICES — HOUSTON, TEXAS

OVERALL PLAN

SCALE *AS NOTED* | DATE *9/2/05*
DWG. NO. *STV-01*

STV Incorporated
engineers/architects/planners/scientists/construction managers
Douglasville, PA Houston, TX Baltimore, MD Pittsburgh, PA

THE LOCATION OF THE PIPELINE FACILITIES AS SHOWN HEREON MUST BE CONSIDERED AS APPROXIMATE ONLY. BEFORE DIGGING OR FOR AN EXACT LOCATION PLEASE CONTACT YOUR STATES UNDERGROUND UTILITY LOCATION SERVICE.

GRAPHIC SCALE:
1"=200' — 200' 0 200' 400'

INVENTORY DRAWING CORRECT ONLY TO DATE OF LAST REVISION

NO	LOC	DESCRIPTION OF REVISION	BY DATE	APPR DATE
5				
4				
3				
2				
1		AS-BUILT A/C R0147	WCL 06/04/07	JMR 06/07

PAGE 1A

BPL TRANSPORTATION, L.L.C.
PIPELINE RELOCATION (OVERALL SITE PLAN)
PAULSBORO TO HARRISBURG
PY 740/750 HX
GREENWICH TWP., GLOUCESTER CO., NJ. & TINICUM TWP., DELAWARE CO., PA.

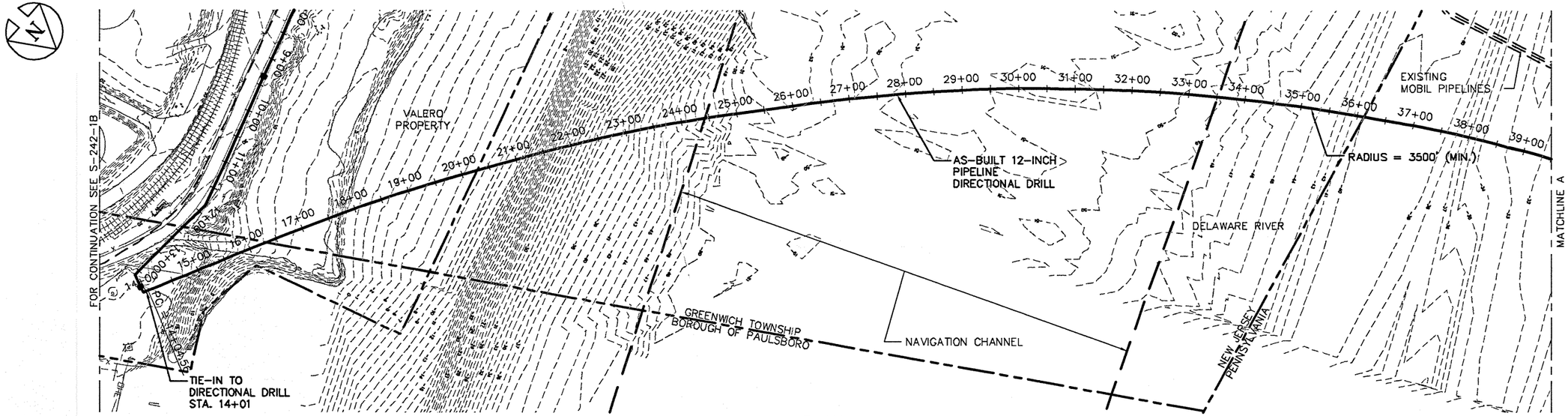
DRAWN: N/A | SCALE: 1" = 200' | DATE: 09/02/05
APPROVED: N/A | CHECKED: N/A
DRAWING NUMBER: 0002A_s-242-1A | REV 1

/R14STN/FORMAT_NEW (04/15/99)

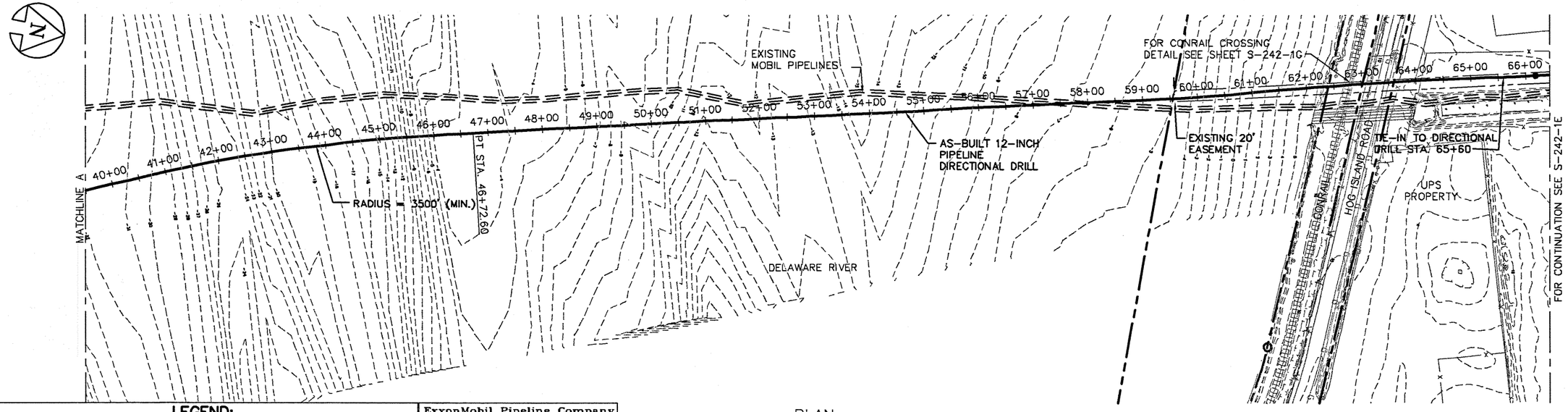
DIA., WALL, GRADE, COATING		
12.75", 0.375" WT., API-5L, ERW, GRADE X42, 14 TO 16 MILS FBE	12.75", 0.500" WT., API-5L, ERW, GRADE X52, 14 TO 16 MILS NAP GARD MARK X NO. 7-2508 FBE AND 24-26 MILS NAP GARD 7-2610 TOPCOAT	12.75", 0.375" WT., API-5L, ERW, GRADE X42, 14 TO 16 MILS FBE

TIE-IN TO DIRECTIONAL DRILL STA. 14+01

TIE-IN TO DIRECTIONAL DRILL STA. 65+60



PLAN



PLAN

LEGEND:

- PROPERTY LINE
- PIPELINE RIGHT-OF-WAY
- AS-BUILT PIPELINE
- EXISTING PIPELINE
- 80 CONTOUR
- BRUSH LINE
- S STORM SEWER
- E ELECTRIC
- G GAS
- T TELEPHONE
- W WATER LINE
- FENCE
- GUIDERAIL
- ROAD
- WETLANDS

ExxonMobil Pipeline Company
ENGINEERING SERVICES HOUSTON, TEXAS

DIRECTIONAL DRILL PLAN

SCALE *AS NOTED* DATE *9/2/06*
DWG. NO. *S-242-1C*

STV Incorporated
engineers/architects/planners/scientists/construction managers
Douglassville, PA Houston, TX Baltimore, MD Pittsburgh, PA

THE LOCATION OF THE PIPELINE FACILITIES AS SHOWN HEREON MUST BE CONSIDERED AS APPROXIMATE ONLY. BEFORE DIGGING OR FOR AN EXACT LOCATION PLEASE CONTACT YOUR STATES UNDERGROUND UTILITY LOCATION SERVICE.

GRAPHIC SCALE:
1"=100' 100' 0 100' 200'

INVENTORY DRAWING CORRECT ONLY TO DATE OF LAST REVISION

PAGE 1C	NO	LOC	DESCRIPTION OF REVISION	BY DATE	APPR DATE
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	4				
	3				
	2				
	1		AS-BUILT A/C R0147	WCL 06/04/07	JMR 06/07

BPL TRANSPORTATION, L.L.C.

PIPELINE RELOCATION (PLAN)
PAULSBORO TO HARRISBURG
PY 740/750 HX
GREENWICH TWP., GLOUCESTER CO., NJ. & TINICUM TWP., DELAWARE CO., PA.

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REV 1

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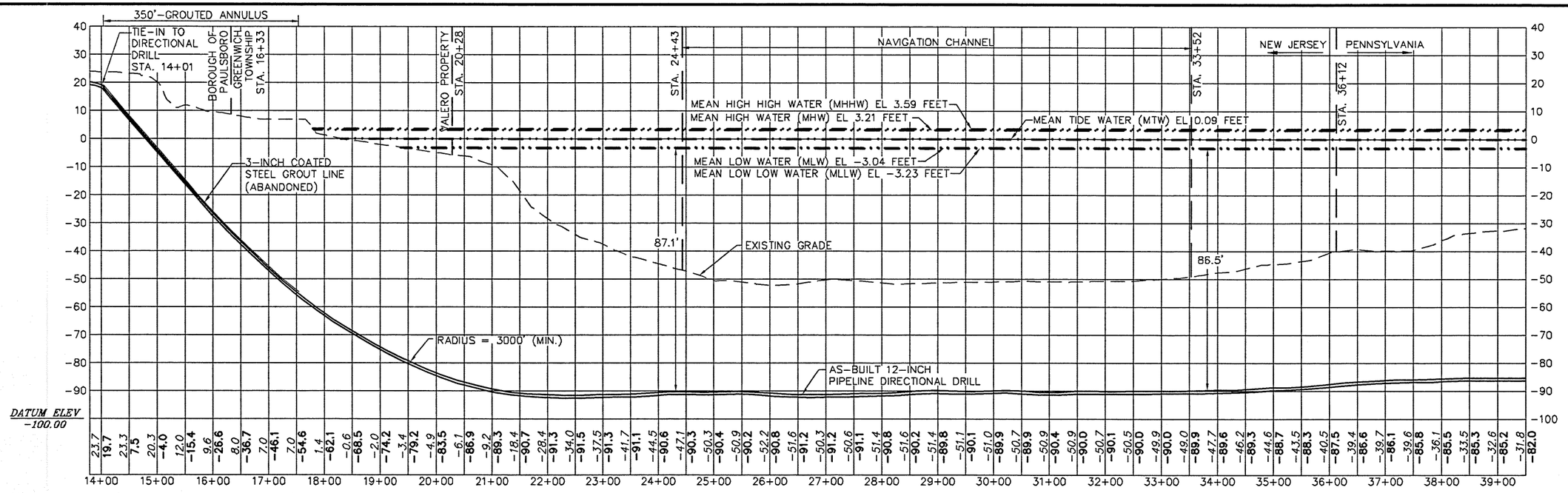
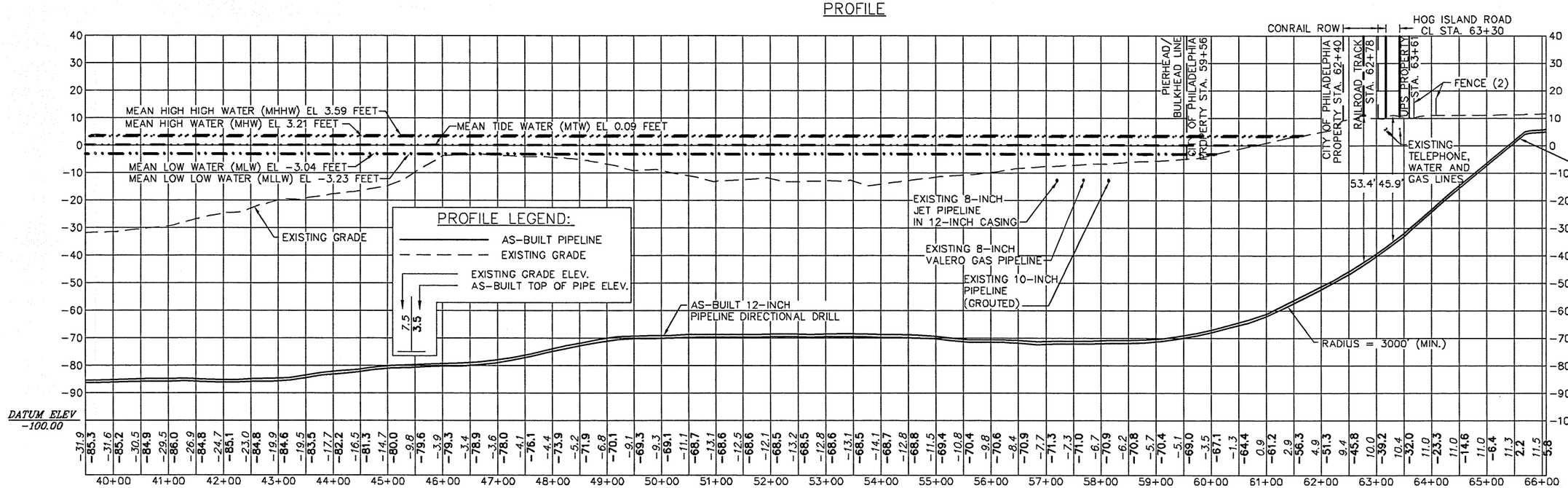


PROFILE



PROFILE

INVENTORY DRAWING CORRECT ONLY TO DATE OF LAST REVISION

STV Incorporated
engineers/architects/planners/scientists/construction managers
Douglassville, PA Houston, TX Baltimore, MD Pittsburgh, PA

THE LOCATION OF THE PIPELINE FACILITIES AS SHOWN HEREON MUST BE CONSIDERED AS APPROXIMATE ONLY. BEFORE DIGGING OR FOR AN EXACT LOCATION PLEASE CONTACT YOUR STATES UNDERGROUND UTILITY LOCATION SERVICE.

ExxonMobil Pipeline Company
ENGINEERING SERVICES HOUSTON, TEXAS

DIRECTIONAL DRILL PROFILE

SCALE AS NOTED DATE 9/2/05
DWG. NO. STV-04

GRAPHIC SCALES:
HORIZ.: 1"=100'
VERT.: 1"=20'
100' 0 100' 200'
20' 0 20' 40'

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4				
3				
2				
1		AS-BUILT A/C R0147	WCL 06/04/07	JMR 06/07

PAGE 1D

BPL TRANSPORTATION, L.L.C.

PIPELINE RELOCATION (PROFILE)
PAULSBORO TO HARRISBURG
PY 740/750 HX
GREENWICH TWP., GLOUCESTER CO., NJ. & TINICUM TWP., DELAWARE CO., PA.

DRAWN: N/A SCALE: AS SHOWN DATE: 09/02/05
APPROVED: N/A CHECKED: N/A
DRAWING NUMBER: 0002D_S-242-1D REV 1

R14STV4/FORMAT_NEW (04/15/99)

BUCKEYE PARTNERS, LP (O & O3)

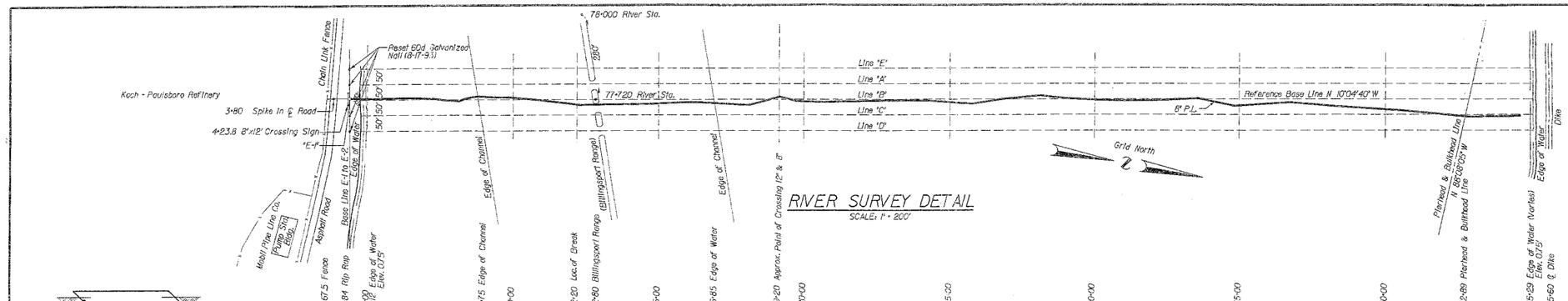
Utility O - 10” Pipeline (Inactive)

Utility O3 - 8” Jet Fuel Pipeline w/in 12” casing

Hydrographic Profile Drawings

PIPE LINE LOCATION

LOCATION	STATION	8" PIPE LINE
Nov.9 1	6+96	On Line
3	7+75	4' East
2	8+09	5' East
4	8+78	5' West
5	9+45	6' West
6	10+43	On Line
8	12+21	2.5' East
Nov.8 5	13+79	20' East
6	14+57	19' East
7	16+23	12' East
8	17+04	17' East
Nov.10 3	18+17	2.3' East
Nov.9 10	19+16	5' West
Nov.10 2	19+46	On Line
1	19+79	10' East
5	21+89	5' East
7	24+03	7' West
8	25+72	19' East
9	26+96	On Line
10	28+15	8' West
11	29+36	On Line
12	30+28	9' East
13	31+13	9' East
14	31+80	6' East
15	32+88	On Line
16	33+55	On Line
17	34+84	30' East
18	35+63	23' East
19	36+88	14' East
20	38+33	25' East
21	40+13	40' East
22	41+45	52' East
23	42+89	63' East
24	44+52	64' East

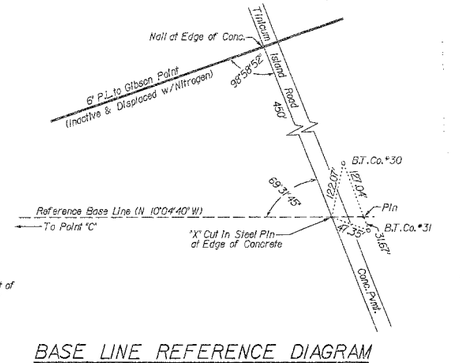


PIPE DETAILS
NO SCALE

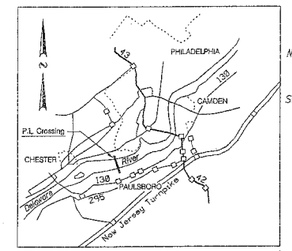
T.B.M. No. 2 50d Nail Set 1.0' High at West Side Power Pole, 20± East of Sta. 4+20 Elev. 11.28' (Fnd. 10-04-01)

T.B.M. No. 3 Top of 1" ϕ G.I.P. Set In Conc. at Ground Level Sta. 4+35 Elev. 10.28' (Fnd. Distrubed 10-04-01, Elev. 10.23')

T.B.M. No. 4 Top of 1.5' Wide Steel Piling 3.0' East of Ch. Lk. Fc. Cor. 300'(±) West of X-ing at Water Edge Sta. 5+03 Elev. 11.71' (Fnd. 10-04-01)



BASE LINE REFERENCE DIAGRAM
NO SCALE



VICINITY MAP
SCALE: 1" = 7.5 Miles

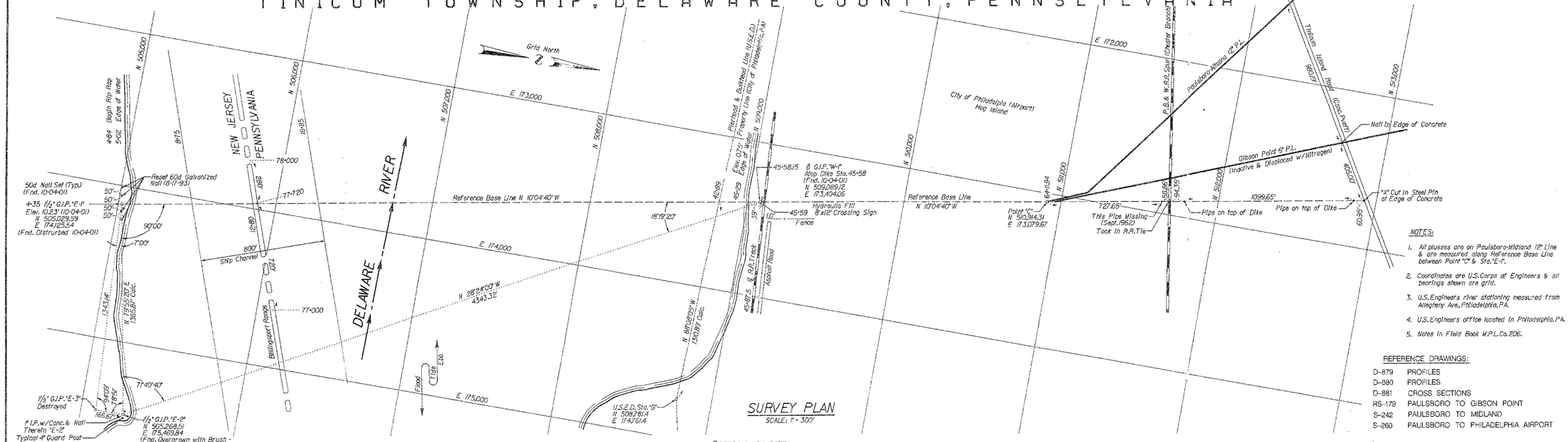
Directions to Crossing

North Bank: Start Philadelphia Int. Airport to East & South Side to end Asphalt Road & Airport Fence. Walk Across R.R. Track & West 100 to Crossing.

South Bank: Enter Mobil Refinery at Gate 3, Guard Shack, off Billingsport Road In Paulsboro, NJ. Go West. North & East Through Tank Farm then North to River, East along River to Crossing.

Waterway: Boat Launch In Darby Creek, South on Darby to River. East on Delaware River 3± Miles to Lat. 39°51'05" N, Long. 75°15'35" W & Crossing.

TINICUM TOWNSHIP, DELAWARE COUNTY, PENNSLYLVANIA



SURVEY PLAN
SCALE: 1" = 300'

NOTES:

1. All plusses are on Paulsboro-Midland 12" Line & are measured along Reference Base Line between Point "C" & Sta. "E-1".
2. Coordinates are U.S. Corps of Engineers & all bearings shown are grid.
3. U.S. Engineers river stationing measured from Allegheny Ave., Philadelphia, PA.
4. U.S. Engineers office located in Philadelphia, PA.
5. Notes in Field Book M.P.L.Co. 206.

REFERENCE DRAWINGS:

D-879	PROFILES
D-880	PROFILES
D-881	CROSS SECTIONS
RS-179	PAULSBORO TO GIBSON POINT
S-242	PAULSBORO TO MIDLAND
S-260	PAULSBORO TO PHILADELPHIA AIRPORT

* REDRAWN ON CADD

NO.	REVISION	DATE	BY	CHK.	APP.
*6	REV. PER FIELD INSP. F.B. 788, PGS. 1-5 BY COB 7-13-95	8-95	RD		
7	REV. PER FIELD INSP. F.B. 598, PGS. 63-68 BY LDS & CEB	8-18-93	LDS	CEB	
11	FIELD INSP. FB. CB-55, PGS. 22-26 BY COB 10-04-01	2-06-02	RLD	COB	COB
12	FIELD INSP. FB. CB-19, PGS. 34-36 BY COB 10-06-99	3-24-00	JSB		
9	FIELD INSP. FB. CB-14, PGS. 49-50 BY COB 9-15-97	1-27-98	JSB		

DRAWING STATUS
AS PER 10-04-01 INSPECTION

Mobil U.S. Marketing & Refining
AMERICAS WHOLESALE ENGINEERING GROUP — DALLAS, TEXAS

DESIGN ENGINEER	JWT		APPROVED
DESIGN CHECK	CBM		
DRAWN BY	HCW		
DRAWING CHECK			DATE

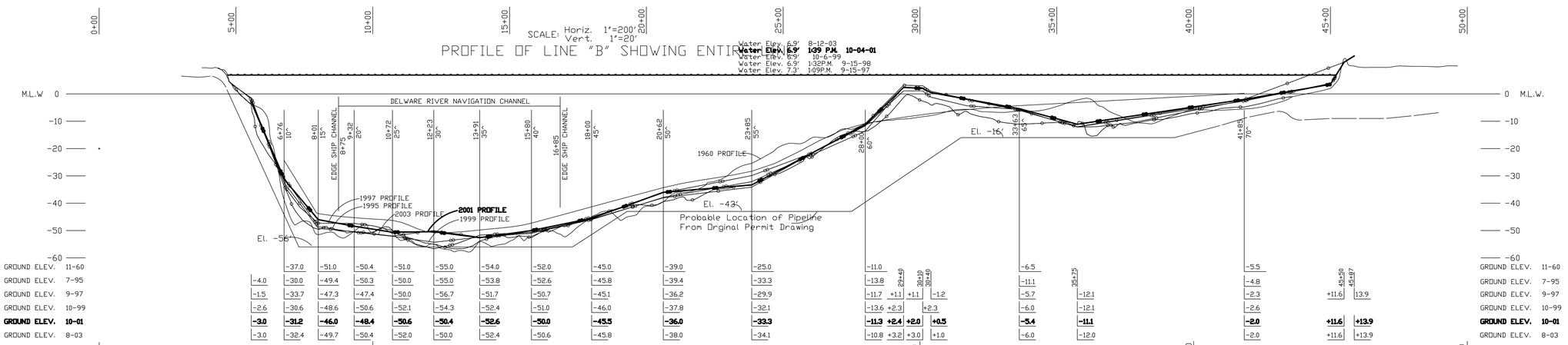
MOBIL PIPE LINE COMPANY
PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PILE LINES
DELAWARE RIVER CROSSING
PLAN

SCALE	DRAWING No.	SHEET	REV. No.
AS NOTED	D-878	1 OF 1	11

PROFILE OF LINE "B" SHOWING ENTIRE CHANNEL

SCALE: Horiz. 1"=200'
Vert. 1"=20'

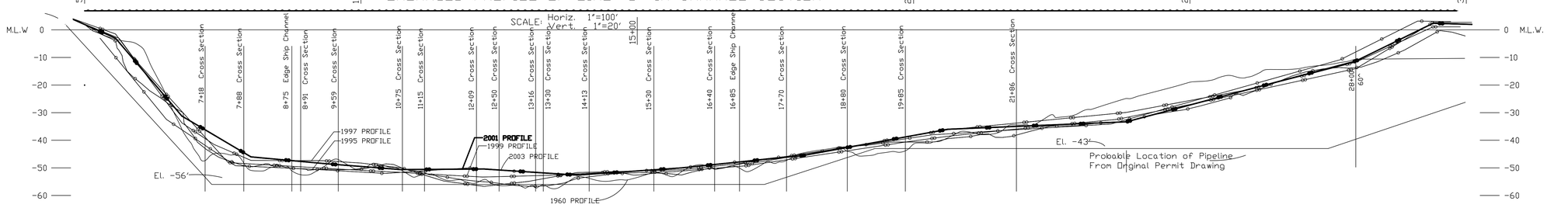
Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39 P.M. 10-04-01
Water Elev. 6.9' 10-6-99
Water Elev. 6.9' 1:32P.M. 9-15-98
Water Elev. 7.3' 1:09P.M. 9-15-97



GROUND ELEV.	11-60		-37.0	-51.0	-50.4	-51.0	-55.0	-54.0	-52.0	-45.0	-39.0	-25.0	-11.0			-6.5		-5.5			GROUND ELEV.	11-60
GROUND ELEV.	7-95	-4.0	-30.0	-49.4	-50.3	-50.0	-55.0	-53.8	-52.6	-45.8	-39.4	-33.3	-13.8	22+49	28+10 28+49	-11.1	35+75	-4.8	45+50	45+87	GROUND ELEV.	7-95
GROUND ELEV.	9-97	-1.5	-33.7	-47.3	-47.4	-50.0	-56.7	-51.7	-50.7	-45.1	-36.2	-29.9	-11.7	+1.1	+1.1 -1.2	-5.7	-12.1	-2.3	+11.6	13.9	GROUND ELEV.	9-97
GROUND ELEV.	10-99	-2.6	-30.6	-48.6	-50.6	-52.1	-54.3	-52.4	-51.0	-46.0	-37.8	-32.1	-13.6	+2.3	+2.3	-6.0	-12.1	-2.6			GROUND ELEV.	10-99
GROUND ELEV.	**10-01**	**-3.0**	**-31.2**	**-46.0**	**-48.4**	**-50.6**	**-50.4**	**-52.6**	**-50.0**	**-45.5**	**-36.0**	**-33.3**	**-11.3**	**+2.4**	**+2.0 +0.5**	**-5.4**	**-11.1**	**-2.0**	**+11.6**	**+13.9**	**GROUND ELEV.**	**10-01**
GROUND ELEV.	8-03	-3.0	-32.4	-49.7	-50.4	-52.0	-50.0	-52.4	-50.6	-45.8	-38.0	-34.1	-10.8	+3.2	+3.0 +1.0	-6.0	-12.0	-2.0	+11.6	+13.9	GROUND ELEV.	8-03

ENLARGED PROFILE OF LINE "B" IN CHANNEL SECTION

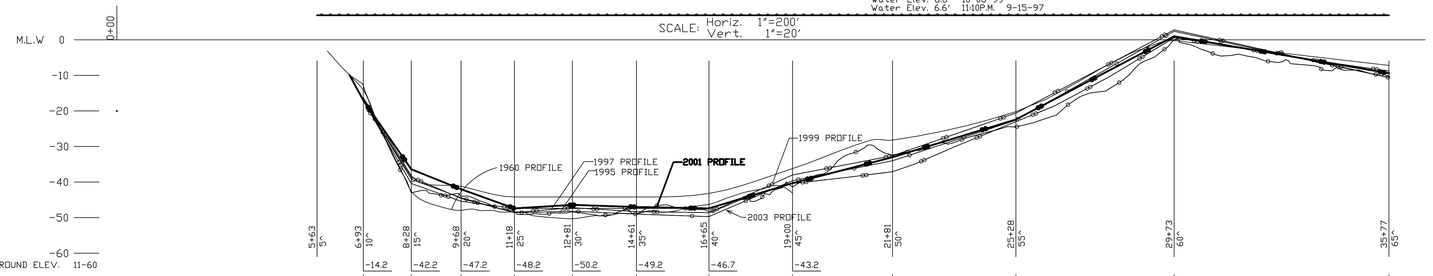
SCALE: Horiz. 1"=100'
Vert. 1"=20'



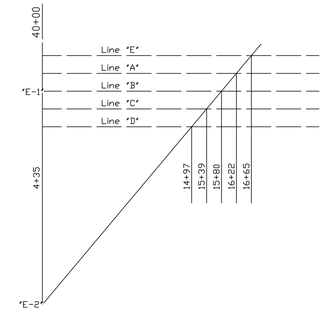
PROFILE OF CHECK LINE

Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39P.M. 10-04-01
Water Elev. 6.6' 10-06-99
Water Elev. 6.6' 1:10P.M. 9-15-97

SCALE: Horiz. 1"=200'
Vert. 1"=20'



GROUND ELEV.	11-60	-14.2	-42.2	-47.2	-48.2	-50.2	-49.2	-46.7	-43.2					
GROUND ELEV.	7-95	-13.0	-43.0	-44.0	-48.2	-48.4	-49.0	-48.5	-41.4	-32.4	-24.5	0.0		-10.4
GROUND ELEV.	9-97	-17.2	-40.4	-45.4	-47.4	-47.4	-47.4	-47.4	-40.4	-37.1	-23.0	+0.6		-8.8
GROUND ELEV.	10-99	-17.0	-38.6	-44.6	-48.6	-47.2	-48.3	-48.6	-38.0	-32.6	-20.6	+2.8		-10.6
GROUND ELEV.	**10-01**	**-17.0**	**-36.4**	**-42.0**	**-47.4**	**-46.4**	**-47.0**	**-47.4**	**-40.3**	**-33.0**	**-22.4**	**+1.0**		**-9.4**
GROUND ELEV.	8-03	-17.0	-39.2	-44.4	-48.6	-48.2	-49.0	-49.7	-39.6	-34.0	-22.6	+2.4		-10.6



METHOD OF STATIONING
CHECK PROFILE

1960 PROFILE
1995 PROFILE
1997 PROFILE
1999 PROFILE
2001 PROFILE
2003 PROFILE

FILL
EROSION

REFERENCE DRAWINGS:

D-878	PLAN
D-880	PROFILES
D-881	CROSS SECTIONS
RS-179	PAULSBORO TO GIBSON PT. 2-8" & 1-10" P.L.

11	Rev. Per Field Insp. F.B. CB-55, Pgs. 22-26, By COB 10-04-01	2-06-02	RLH	COB	COB
10	Rev. Per Field Insp. F.B. CB-19, Pgs. 34-36, By COB 10-06-99	10-99	GKT	ISB	
9	Rev. Per Field Insp. F.B. CB-14, Pgs. 49-50, By COB 9-15-97	1-98	ISB		
13	Drawing Revision of 8-12-03 Insp. by Buzzard Surveying, Inc.	1-05	GJM		COB
12	Field Insp. By Hudson Engineering 8-12-03				

AS PER 8-12-03
INSPECTION

JWT
TMC / WJP 11-3-93
CEM

FIRST ORIGINAL SIGNED BY:
G.T.J.
3-17-61

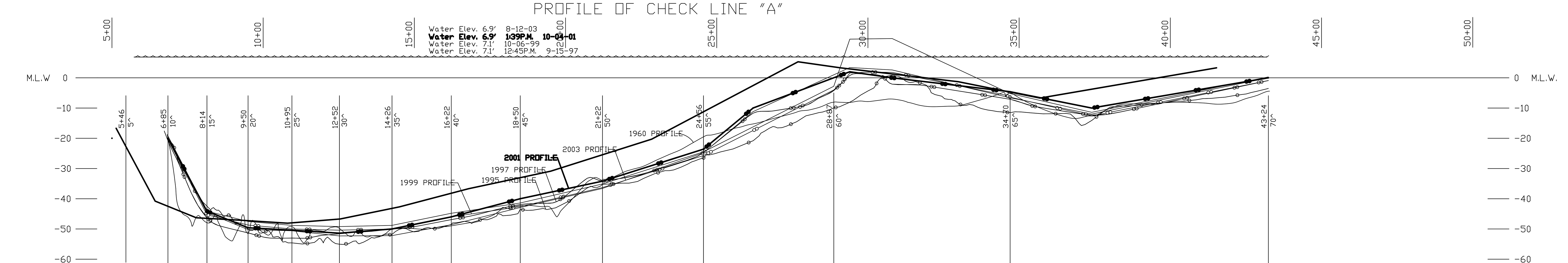
AS NOTED

PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PIPELINES
DELAWARE RIVER CROSSING
PROFILES

D-879 CAD MAP

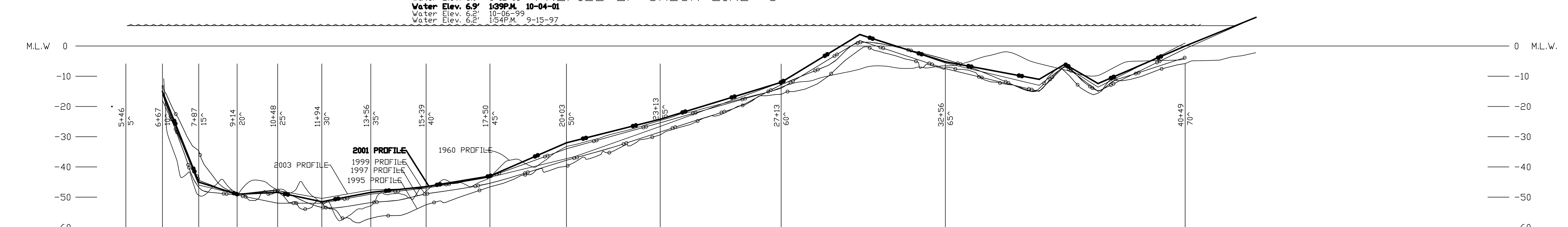
13

PROFILE OF CHECK LINE "A"



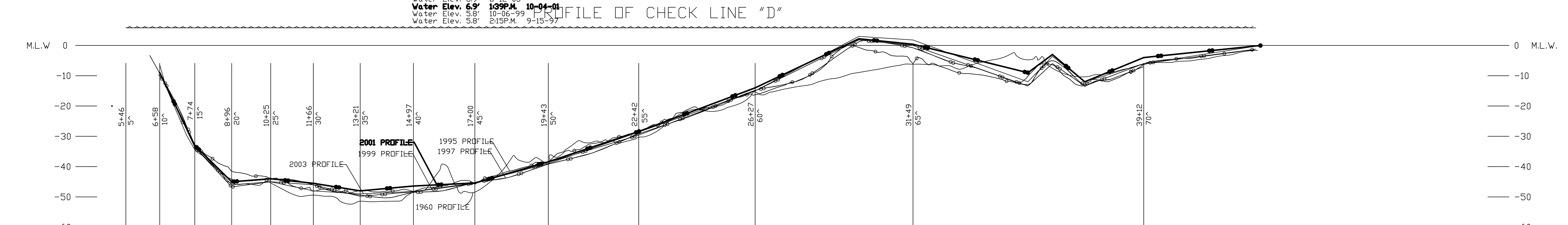
	6+85	8+14	9+50	10+95	12+52	14+26	16+22	18+50	19+72	20+72	21+22	24+56	26+20	28+00	28+87	29+40	30+40	30+80	34+70	37+40	43+24
GROUND ELEV. 11-60	-19.8	-48.5	-51.5	-49.5	-50.5	-50.5	-49.5	-43.5			-36.5	-20.5			-8.0				-3.5		-3.5
GROUND ELEV. 7-95	-20.0	-42.5	-50.0	-54.6	-55.0	-51.8	-48.5	-43.5			-35.2	-26.5			-10.0				-11.5		-3.5
GROUND ELEV. 9-97	-20.8	-46.3	-51.3	-53.0	-51.6	-50.0	-46.9	-41.9	-40.9	-33.2	-34.1	-24.7	-11.7	-8.9	-4.2	+0.8	+0.8	-2.1	-7.1	-12.3	-0.9
GROUND ELEV. 10-99	-20.4	-45.3	-48.7	-50.0	-50.4	-50.0	-46.0	-42.6			-36.3	-25.7			-4.0	+1.6		+1.8	-6.4	-12.6	-0.9
GROUND ELEV. 10-01	**-20.0**	**-44.1**	**-49.6**	**-50.4**	**-51.4**	**-50.0**	**-46.0**	**-40.0**			**-34.2**	**-23.6**	**-10.0**			**+2.0**		**0.0**	**-4.6**	**-10.0**	**0.0**
GROUND ELEV. 8-03	-20.0	-44.6	-50.2	-50.6	-52.3	-52.2	-48.6	-42.9			-36.6	-24.8	-11.2			+3.4		+2.6	-6.6	-12.0	0.0

PROFILE OF CHECK LINE "C"



	6+67	7+87	9+14	10+48	11+94	13+56	15+39	17+50	20+03	23+13	27+13	29+73	32+56	35+66	36+51	37+61	40+49
GROUND ELEV. 11-60	-11.0	-53.0	-53.0	-51.0	-55.2	-56.0	-51.8	-47.5	-38.8	-27.8	-13.8		-7.8				-6.3
GROUND ELEV. 7-95	-13.7	-34.6	-49.0	-47.7	-51.5	-57.0	-52.5	-46.6	-39.8	-29.4	-16.0		-7.0				-5.8
GROUND ELEV. 9-97	-14.7	-46.8	-49.0	-47.8	-53.4	-51.8	-48.9	-45.4	-37.8	-28.8	-12.8	+1.2	-4.4	-14.8	-7.0	-14.8	-3.8
GROUND ELEV. 10-99	-18.0	-44.4	49.3	-52.0	-52.0	-49.0	-47.0	-43.2	-34.0	-25.4	-14.0	+1.8	-7.6	-15.0	-6.6	-15.0	-0.9
GROUND ELEV. 10-01	**-15.0**	**-45.0**	**49.0**	**-48.4**	**-51.5**	**-48.4**	**-46.5**	**-43.0**	**-32.0**	**-24.2**	**-12.0**	**+3.8**	**-5.2**	**-11.0**	**-6.0**	**-12.4**	**0.0**
GROUND ELEV. 8-03	-16.0	-46.0	49.0	-47.8	-50.4	-47.6	-47.0	-43.4	-36.6	-26.6	-12.0	+4.0	-5.6	-13.0	-6.6	-13.6	+1.0

PROFILE OF CHECK LINE "D"



	6+58	7+74	8+96	10+25	11+66	13+21	14+97	17+00	19+43	22+42	26+27	27+10	29+70	31+49	35+29	36+10	37+17	39+12	
GROUND ELEV. 11-60	-6.4	-34.4	-45.4	-45.4	-49.4	-51.4	-48.4	-48.4	-39.3	-30.3	-15.3			-6.3				-6.3	
GROUND ELEV. 7-95	-9.0	-32.4	-41.6	-44.0	-48.0	-48.0	-48.2	-45.8	-38.5	-28.8	-16.0			-6.0				-6.5	
GROUND ELEV. 9-97	-9.2	-32.8	-44.2	-44.2	-46.0	-49.4	-48.5	-45.2	-39.2	-29.2	-14.8	-13.2	+1.2	-0.8	-13.0	-5.0	-13.0	-7.0	
GROUND ELEV. 10-99	-9.0	-33.6	-46.7	-45.0	-46.0	-49.8	-48.3	-45.6	-39.6	-29.6	-15.0		+1.8	0.0	-13.4	-6.0	-13.4	-6.0	
GROUND ELEV. 10-01	**-9.0**	**-33.0**	**-45.0**	**-44.0**	**-45.5**	**-48.0**	**-46.4**	**-45.4**	**-38.4**	**-28.4**	**-14.0**		**+2.2**	**+0.4**	**-9.0**	**-3.0**	**-12.0**	**-4.0**	**0.0**
GROUND ELEV. 8-03	-9.0	-33.0	-46.0	-45.0	-48.0	-49.0	-48.2	-45.4	-39.0	-28.6	-15.0		+3.0	+1.8	-12.0	-3.6	-12.0	-6.0	0.0

5+00 10+00 15+00 20+00 25+00 30+00 35+00 40+00 45+00 50+00

1960 PROFILE
1995 PROFILE
1997 PROFILE
1999 PROFILE
2001 PROFILE
2003 PROFILE

FILL

EROSION

SCALE: Horiz. 1"=200'
Vert. 1"=20'

REFERENCE DRAWINGS:

D-878 PLAN
D-879 PROFILES
D-881 CROSS SECTIONS
RS-179 PAULSBORO TO GIBSON PT. 2-8" & 1-10" P.L.

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10	Rev. Per Field Insp. F.B. CB-19, Pgs. 34-36, By COB 10-06-99	3-24-00	GKT	ISB	
9	Rev. Per Field Insp. F.B. CB-14, Pgs. 49-50, By COB 9-15-97	1-98	ISB		
13	Drawing Revision of 8-12-03 Insp. by Buzzard Surveying, Inc.	1-05	GJM		COB
12	Field Insp. by Hudson Engineering 8-12-03				

AS PER 8-12-03
INSPECTION

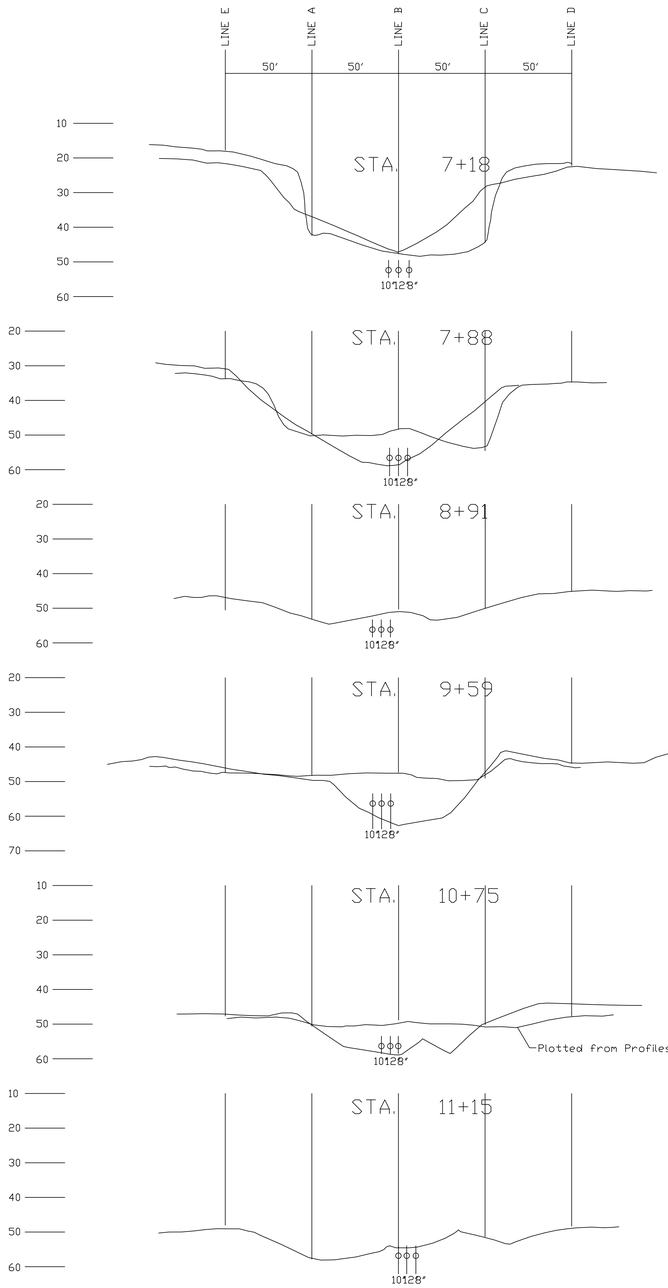
JWT

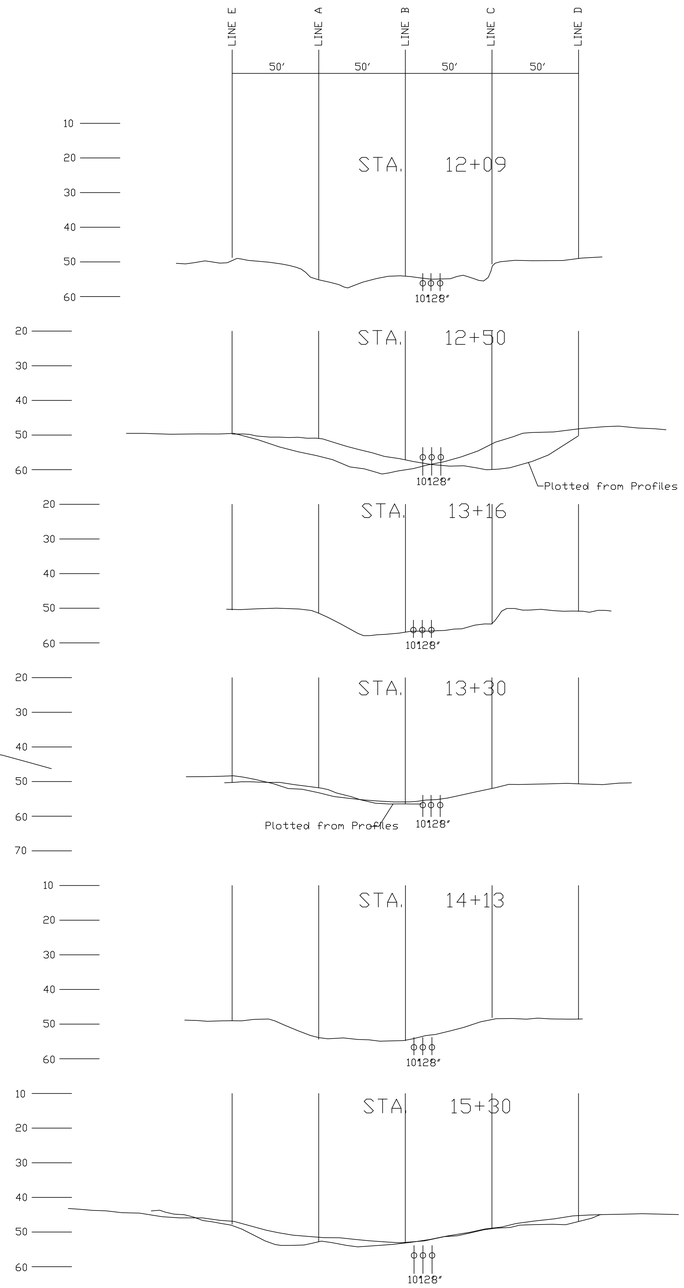
TMC/WJP 11-2-93
CEM

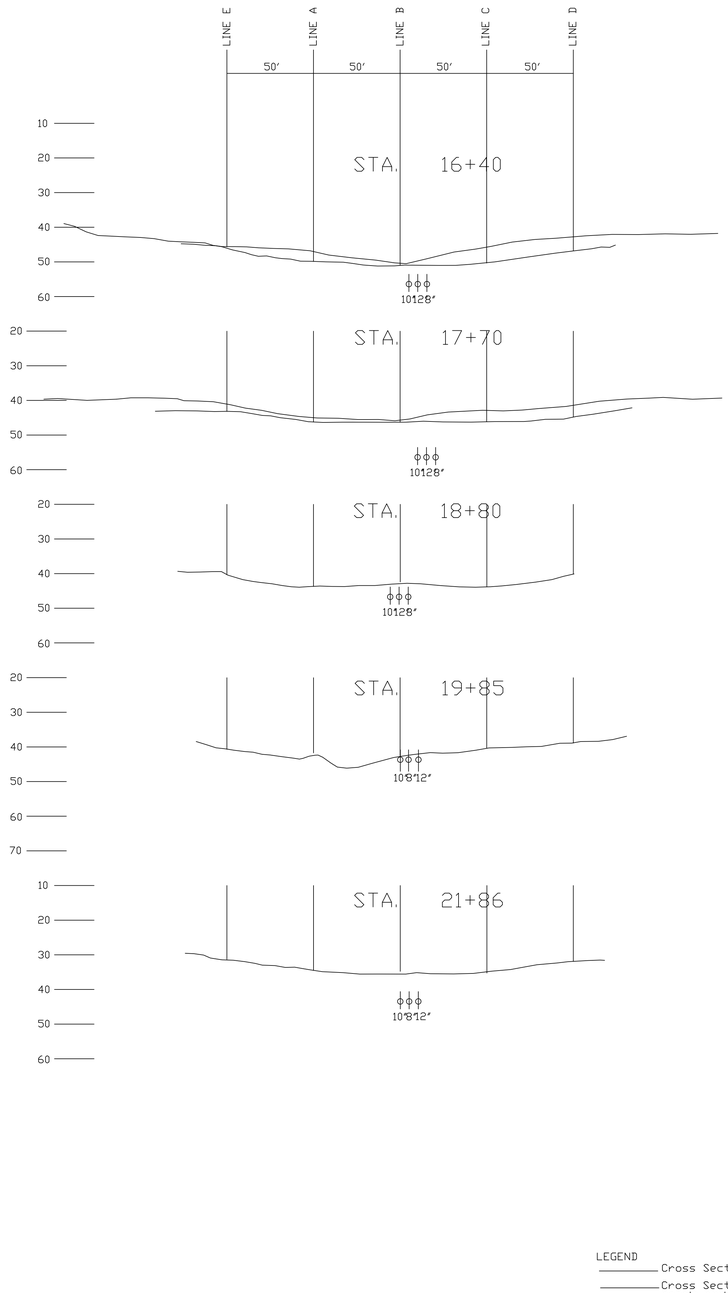
FIRST ORIGINAL SIGNED BY:
G.T.J.
3-17-61

PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PIPELINES
DELAWARE RIVER CROSSING
PROFILES

AS NOTED D-880 CAD MAP 13







LEGEND

Cross Sections of Nov. 1960 Survey made by M.P.L. Co.

Cross Sections of April 1958 Survey made prior to repair and backfill of pipe lines. Hydrography by Marine Surveys, Inc. and Missouri Valley Dredging Co.

NOTES:

1. 1-8″ Line is in 12″ Casing.
2. Pipe Lines shown in locations as determined by this survey but at elevations indicated on original permit drawings.

REFERENCE DRAWINGS:

D-1482-1-PL PLAN
D-1482-2-PLPROFILES
D-1482-3-PLPROFILES

AS PER 11-60 INSPECTION

JWT
CEM
TKL

1 REDRAWN ON CADD 8-95 RD

FIRST ORIGINAL SIGNED BY
G. J.
3-17-61

HORIZ. 1″=40′
VERT. 1″=20′

MOBIL PIPE LINE COMPANY
PAULSBORO TO GIBSON POINT
PAULSBORO TO MIDLAND
2-8″ & 1-10″ PRODUCTS PILE LINES
DELAWARE RIVER CROSSING
CROSS SECTIONS

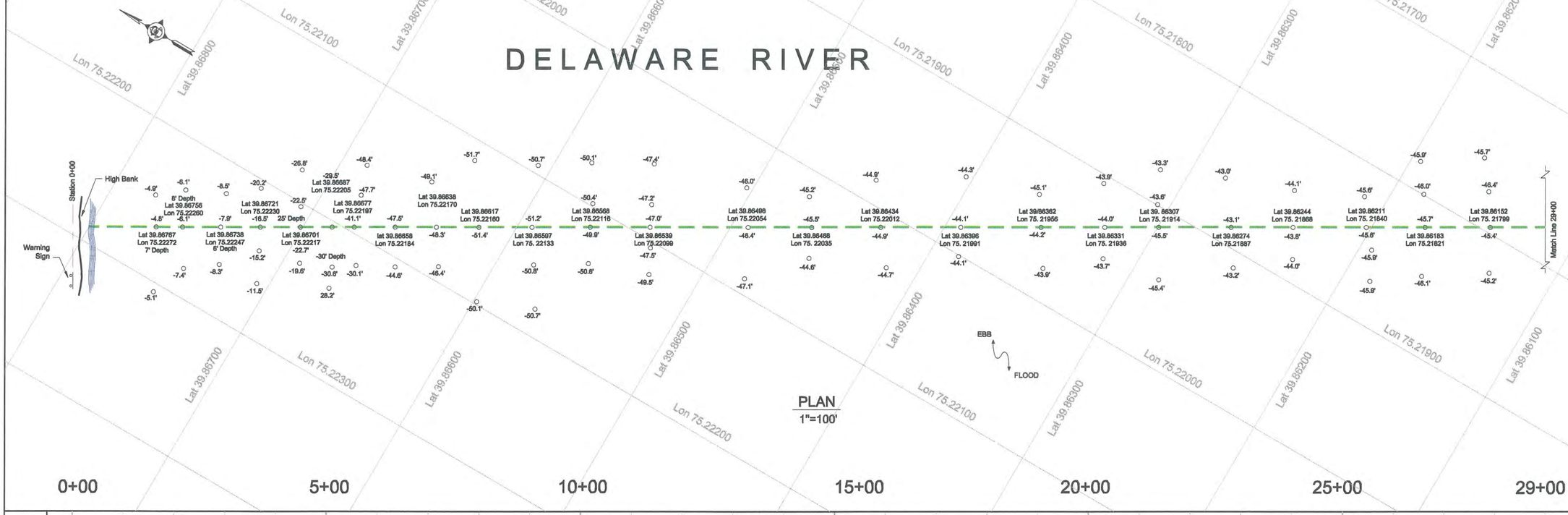
D-881

CAD MAP 1 1 1

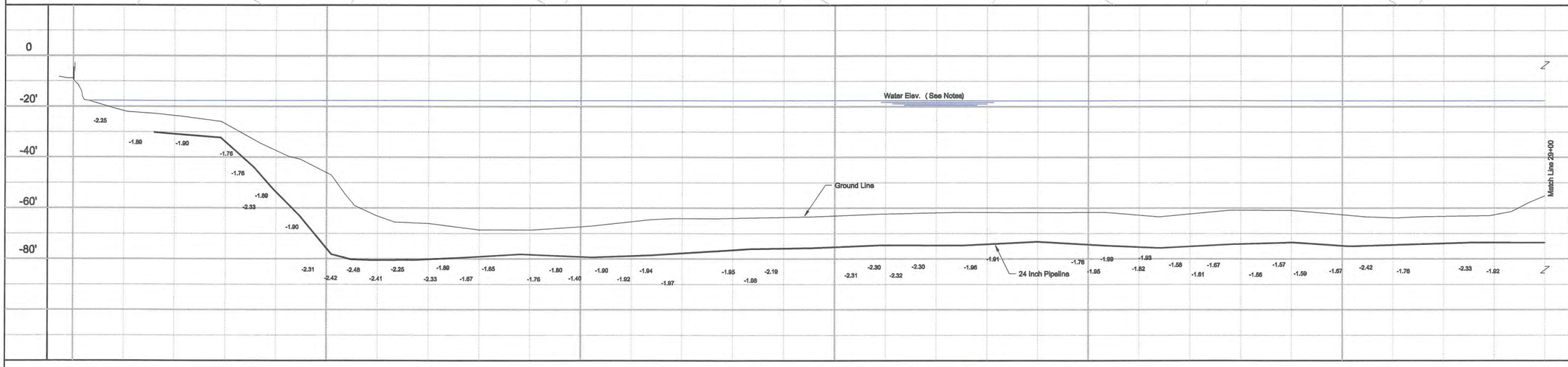
BUCKEYE PARTNERS, LP (T)

Utility T – 24” Product Pipeline
Depth of Cover Survey

DELAWARE RIVER



PLAN
1"=100'



PROFILE
1"=100' HORIZ
1"=20' VERT

Scale (feet)
100' 0 100'

LEGEND
- GROUND LINE
- LINE BURIED
- LINE EXPOSED (plan only)
- LINE SUSPENDED (plan only)
- LINE EXP. & OR SUSP. (profile only)
- RIVER WT.

Notes:
1. Bench mark established on the south bank at bottom of the warning sign on its east side. Assumed elevation 0.00 feet.
2. Water elevation was -17.8 feet at time of survey.
3. Pipeline is covered and stable throughout the crossing.
4. Date of Inspection, 26 august 2010.

MESCO DIVERS
MARINE ENGINEERING SYSTEMS CO.
ENGINEERING DEEP DIVING HULL CLEANING N.D.T. • INTERNATIONAL •
STROUD DIVING & HYDROGRAPHY

REVISION	AFE	BY	DATE

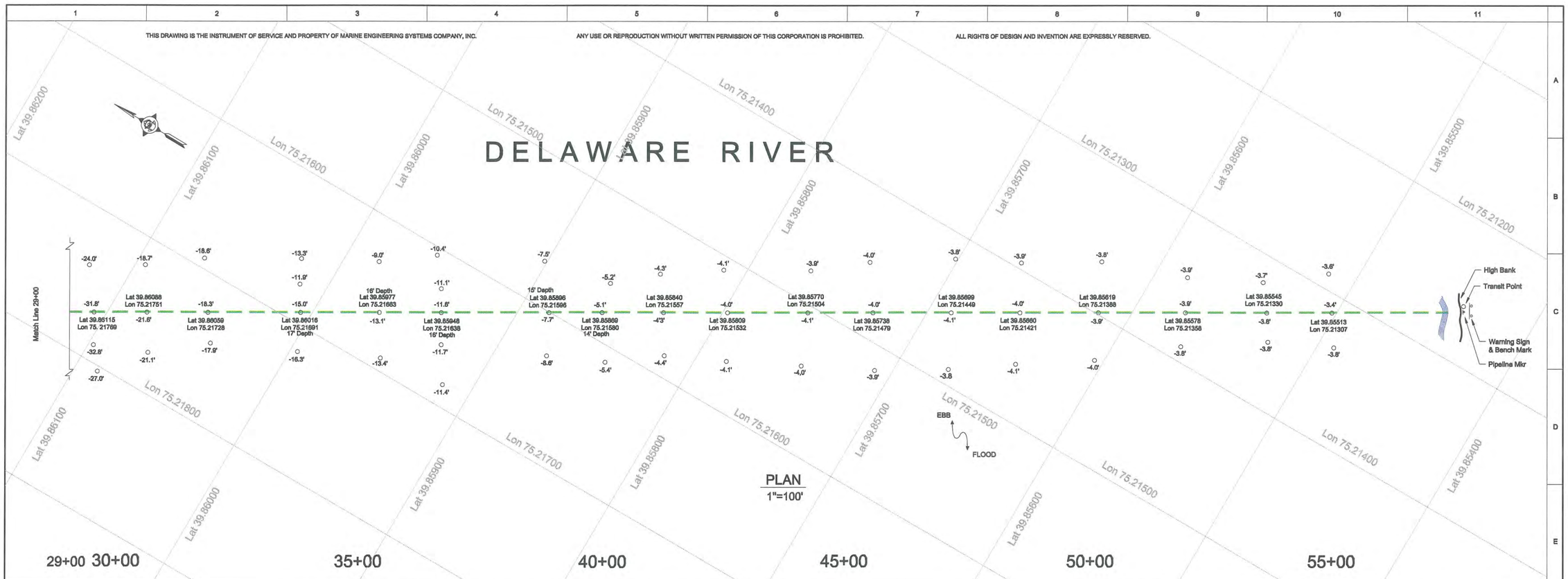
STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
5030 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32254
(904) 355-1777 * FAX 353-5500

1-24 Inch (EP736XX/XX736DR) Pipeline
Delaware River
Philadelphia, PA
Buckeye Partners, L.P.

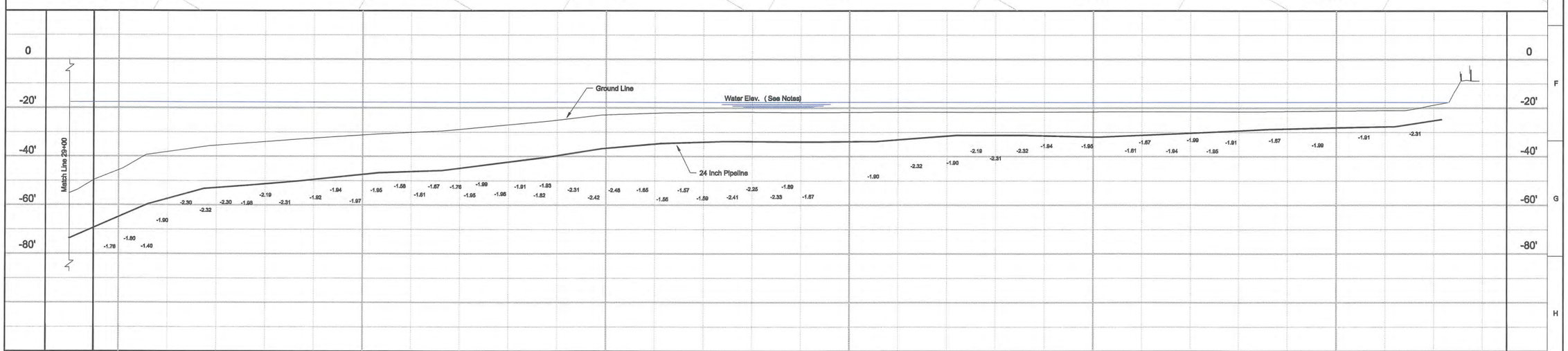
Sheet 1 of 2

SCALE	
PLAN	1"=100'
PROFILE	1"=20'
DRAWN	R.E. Estes
CHECKED	W.F. Hux
DATE	1 Oct 10
SDH	48-96

GPS / TRIMBLE



PLAN
1"=100'



PROFILE
1"=100' HORIZ
1"=20' VERT

Scale (feet)
100' 0 100'

LEGEND
- GROUND LINE
- LINE BURIED
- LINE EXPOSED (plan only)
- LINE SUSPENDED (plan only)
- LINE EXP. & OR SUSP. (profile only)
- RIVER WT.

MESCO DIVERS
MARINE ENGINEERING SYSTEMS CO.
ENGINEERING DEEP DIVING HULL CLEANING N.D.E.
• INTERNATIONAL •
STROUD DIVING & HYDROGRAPHY

	REVISION	AFE	BY	DATE
△				
△				
△				
△				
△				

STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
5030 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32254
(904) 355-1777 * FAX 353-5500

1-24 Inch (EP736XX/XX736DR) Pipeline
Delaware River
Philadelphia, PA
Buckeye Partners, L.P.

Sheet 2 of 2

SCALE	
PLAN	1"=100'
PROFILE	1"=20'
DRAWN	R.E. Estes
CHECKED	W.F. Hux
DATE	1 Oct 10
SDH	48-96

2

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	0-30		
	0-15		
	0+00		
	0+15		
WE	0+30	-20	-30
	0+45	-20	-30
	0+57	-20	-30
	0+75	-20	-30
	0+90	-21	-30
	1+05	-22	-30
	1+20	-22	-30
	1+35	-22	-30
	1+50	-23	-31
	1+65	-23	-31
	1+80	-23	-31
	1+95	-24	-32
	2+10	-24	-32
	2+25	-24	-32
	2+40	-24	-32
	2+55	-25	-32
	2+70	-25	-32
	2+85	-25	-32
	3+00	-26	-33
	3+15	-26	-35
	3+30	-28	-37
	3+45	-29	-43
	3+60	-33	-43
	3+75	-34	-43
	3+90	-34	-49
	4+05	-34	-58
	4+20	-35	-60
	4+35	-36	-61
	4+50	-41	-63
	4+65	-43	-65
	4+80	-44	-67
	4+95	-46	-71
	5+10	-47	-74
	5+25	-48	-76
	5+40	-52	-78
	5+55	-57	-79
	5+70	-59	-81
	5+85	-61	-81
	6+00	-63	-81
	6+15	-63	-81
	6+30	-64	-81
	6+45	-66	-81
	6+60	-66	-81
	6+75	-66	-81
	6+90	-66	-81
	7+05	-67	-81
	7+20	-67	-81
	7+35	-67	-81
	7+50	-67	-81
	7+65	-67	-81
	7+80	-67	-81
	7+95	-68	-80
	8+10	-69	-79
	8+25	-69	-79
	8+40	-69	-79
	8+55	-69	-79
	8+70	-69	-79
	8+85	-69	-79
	9+00	-69	-79
	9+15	-69	-79
	9+30	-69	-79
	9+45	-69	-79
	9+60	-69	-79
	9+75	-69	-79
	9+90	-68	-79

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	10+05	-68	-80
	10+20	-68	-80
	10+35	-67	-80
	10+50	-67	-80
	10+65	-67	-80
	10+80	-67	-80
	10+95	-67	-80
	11+10	-66	-79
	11+25	-66	-79
	11+40	-65	-79
	11+55	-65	-79
	11+70	-65	-79
	11+85	-65	-79
	12+00	-65	-79
	12+15	-65	-79
	12+30	-65	-78
	12+45	-65	-77
	12+60	-65	-77
	12+75	-65	-77
	12+90	-66	-77
	13+05	-64	-77
	13+20	-64	-77
	13+35	-64	-77
	13+50	-64	-77
	13+65	-64	-77
	13+80	-64	-77
	13+95	-64	-77
	14+10	-64	-76
	14+25	-64	-76
	14+40	-64	-76
	14+55	-64	-76
	14+70	-64	-76
	14+85	-64	-76
	15+00	-64	-76
	15+15	-64	-76
	15+30	-64	-76
	15+45	-64	-76
	15+60	-64	-76
	15+75	-64	-76
	15+90	-64	-76
	16+05	-63	-75
	16+20	-63	-75
	16+35	-63	-75
	16+50	-62	-75
	16+65	-62	-75
	16+80	-62	-75
	16+95	-62	-75
	17+10	-62	-75
	17+25	-62	-75
	17+40	-62	-75
	17+55	-62	-75
	17+70	-62	-75
	17+85	-62	-75
	18+00	-62	-75
	18+15	-62	-75
	18+30	-62	-75
	18+45	-62	-74
	18+60	-62	-74
	18+75	-62	-74
	18+90	-62	-74
	19+05	-62	-74
	19+20	-62	-74
	19+35	-62	-74
	19+50	-62	-74
	19+65	-62	-74
	19+80	-62	-74
	19+95	-62	-74
	20+10	-62	-75
	20+25	-62	-75
	20+40	-62	-75
	20+55	-62	-75
	20+70	-62	-75
	20+85	-62	-75
	21+00	-62	-75

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	21+15	-62	-75
	21+30	-63	-75
	21+45	-64	-75
	21+60	-64	-76
	21+75	-64	-76
	21+90	-63	-76
	22+05	-63	-75
	22+20	-62	-75
	22+35	-62	-75
	22+50	-61	-75
	22+65	-61	-75
	22+80	-61	-75
	22+95	-61	-75
	23+10	-61	-75
	23+25	-61	-75
	23+40	-61	-75
	23+55	-61	-74
	23+70	-61	-74
	23+85	-61	-74
	24+00	-61	-74
	24+15	-61	-74
	24+30	-61	-74
	24+45	-62	-74
	24+60	-62	-74
	24+75	-62	-74
	24+90	-62	-74
	25+05	-62	-75
	25+20	-62	-75
	25+35	-62	-75
	25+50	-64	-75
	25+65	-64	-75
	25+80	-64	-75
	25+95	-64	-75
	26+10	-64	-75
	26+25	-64	-75
	26+40	-64	-75
	26+55	-64	-75
	26+70	-64	-75
	26+85	-64	-75
	27+00	-64	-74
	27+15	-64	-74
	27+30	-64	-74
	27+45	-64	-74
	27+60	-64	-74
	27+75	-64	-74
	27+90	-64	-74
	28+05	-64	-75
	28+20	-64	-75
	28+35	-64	-74
	28+50	-60	-74
	28+65	-59	-74
	28+80	-58	-74
	28+95	-56	-74
	29+10	-55	-72
	29+25	-52	-71
	29+40	-51	-70
	29+55	-50	-69
	29+70	-48	-67
	29+85	-47	-66
	30+00	-46	-65
	30+15	-44	-64
	30+30	-42	-63
	30+45	-40	-61
	30+60	-39	-59
	30+75	-39	-59
	30+90	-39	-58
	31+05	-38	-58
	31+20	-38	-57
	31+35	-37	-56
	31+50	-37	-55
	31+65	-37	-55
	31+80	-36	-55
	31+95	-36	-54

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	32+10	-35	-53
	32+25	-35	-53
	32+40	-35	-53
	32+55	-35	-53
	32+70	-34	-53
	32+85	-34	-53
	33+00	-34	-51
	33+15	-34	-51
	33+30	-33	-51
	33+45	-33	-51
	33+60	-33	-51
	33+75	-33	-51
	33+90	-33	-51
	34+05	-33	-50
	34+20	-33	-50
	34+35	-33	-50
	34+50	-32	-49
	34+65	-32	-49
	34+80	-32	-49
	34+95	-32	-48
	35+10	-32	-48
	35+25	-32	-48
	35+40	-32	-48
	35+55	-31	-47
	35+70	-31	-47
	35+85	-31	-47
	36+00	-30	-46
	36+15	-30	-46
	36+30	-30	-46
	36+45	-30	-46
	36+60	-30	-46
	36+75	-30	-46
	36+90	-29	-46
	37+05	-29	-45
	37+20	-29	-45
	37+35	-28	-44
	37+50	-28	-44
	37+65	-28	-44
	37+80	-28	-44
	37+95	-28	-43
	38+10	-28	-43
	38+25	-27	-43
	38+40	-26	-42
	38+55	-26	-41
	38+70	-26	-41
	38+85	-26	-40
	39+00	-26	-40
	39+15	-26	-40
	39+30	-26	-39
	39+45	-26	-39
	39+60	-25	-39
	39+75	-25	-39
	39+90	-24	-39
	40+05	-23	-37
	40+20	-23	-37
	40+35	-23	-36
	40+50	-23	-36
	40+65	-23	-36
	40+80	-23	-35
	40+95	-22	-35
	41+10	-22	-35
	41+25	-22	-35
	41+40	-22	-35
	41+55	-22	-35
	41+70	-22	-34
	41+85	-22	-34
	42+00	-22	-34
	42+15	-22	-34
	42+30	-22	-34
	42+45	-22	-34
	42+60	-22	-34
	42+75	-22	-34
	42+88	-22	-34
	43+05	-22	-34
	43+20	-22	-34

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	43+20	-22	-34
	43+35	-22	-34
	43+50	-22	-34
	43+66	-22	-34
	43+80	-22	-34
	43+95	-22	-34
	44+10	22	-34
	44+25	-22	-34
	44+40	-21	-34
	44+55	-22	-34
	44+70	-21	-34
	44+95	-22	-34
	45+10	-22	-34
	45+25	-22	-34
	45+40	-22	-34
	45+55	-22	-34
	45+80	-22	-34
	45+70	-22	-34
	45+85	-22	-33
	46+00	-22	-33
	46+15	-22	-33
	46+30	-22	-32
	46+45	-22	-32
	46+60	-22	-32
	46+75	-21	-32
	46+90	-21	-32
	47+05	-21	-32
	48+20	-21	-32
	48+35	-21	-32
	48+50	-21	-32
	48+65	-21	-32
	48+80	-21	-32
	48+95	-21	-32
	49+10	-21	-31
	49+25	-21	-31
	49+40	-21	-31
	49+55	-21	-31
	49+70	-21	-31
	49+85	-21	-31
	50+00	-21	-31
	50+15	-21	-31
	50+30	-21	-31
	50+30	-21	-31
	50+45	-21	-31
	50+60	-21	-31
	50+75	-21	-31
	50+90	-21	-31
	51+05	-21	-31
	52+20	-21	-31
	52+35	-21	-31
	52+40	-21	-31
	52+55	-21	-31
	52+70	-21	-31
	52+85	-20	-30
	53+00	-20	-30
	53+15	-20	-30
	53+30	-20	-29
	53+45	-20	-29
	53+60	-20	-29
	53+75	-19	-29
	53+90	-19	-28
	54+05	-19	-28
	54+20	-19	-28
	54+35	-19	-28
	54+50	-19	-27
	54+65	-19	-27
	54+80	18	-27
	54+95	-18	-26
	55+10	-18	-26
	56+25	-18	-25
	56+40	-17	-25
	56+55	-17	-24
	56+70	-17	-24
	56+85	-17	-24
	57+00	-17	-24
	57+15	-17	-24
	57+30	-17	-24
WE	57+40	-17	-24

LEGEND

- GROUND LINE
- LINE BURIED
- LINE EXPOSED (plan only)
- LINE SUSPENDED (plan only)
- LINE EXP. & OR SUSP. (profile only)
- RIVER WT.

PROFILE
1"=100' HORIZ
1"=20' VERT

Scale (feet)
100' 0 100'

MESCO DIVERS
MARINE ENGINEERING SYSTEMS CO.
ENGINEERING DEEP DIVING HULL CLEANING N.D.E. INTERNATIONAL
STROUD DIVING & HYDROGRAPHY

	REVISION	AFE	BY	DATE
△				
△				
△				
△				
△				

STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
5030 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32254
(904) 356-1777 * FAX 353-5800

1-24 Inch (EP736XOXOX736DR) Pipeline
Delaware River
Philadelphia, PA
Buckeye Partners, L.P.

Sheet 2 of 2

SCALE
PLAN 1"=100'
PROFILE 1"=20'

DRAWN R.E. Estes
CHECKED W.F. Hux
DATE 1 Oct 10
SDH 48-96

2

PBF ENERGY

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 11, 2012

Sam DeGeorge
Operations Support Group/ISO Superintendent
Paulsboro Refining Company
800 Billingsport Rd.
Room #50-257
Paulsboro, NJ 08066

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. DeGeorge:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

You were initially contacted by me on December 5, 2011, to request information about known crossings within Reaches A-A and A. You identified and provided information for one utility line operated by PBF Energy crossing the Delaware River within Reach A. On March 5, 2012, I requested supplemental information from you to more accurately identify the location and depth of the crossing. Attached is the information GBA currently has for the 8" pipeline operated by PBF Energy and crossing the channel at approximately Channel Station 77+960. A review of the information prompts the following observations, questions and/or concerns:

- All the information provided appears to be hydrographic surveys undertaken for the purpose of determining depth of cover over the utility.
- The utility depth shown appears to be based upon that proposed in the permit application (-56' COE MLW across the channel), not actual installed depth.
- Conversion of the above to the project datum equates to -56.2' MLLW.
- No as-built drawing has been provided.

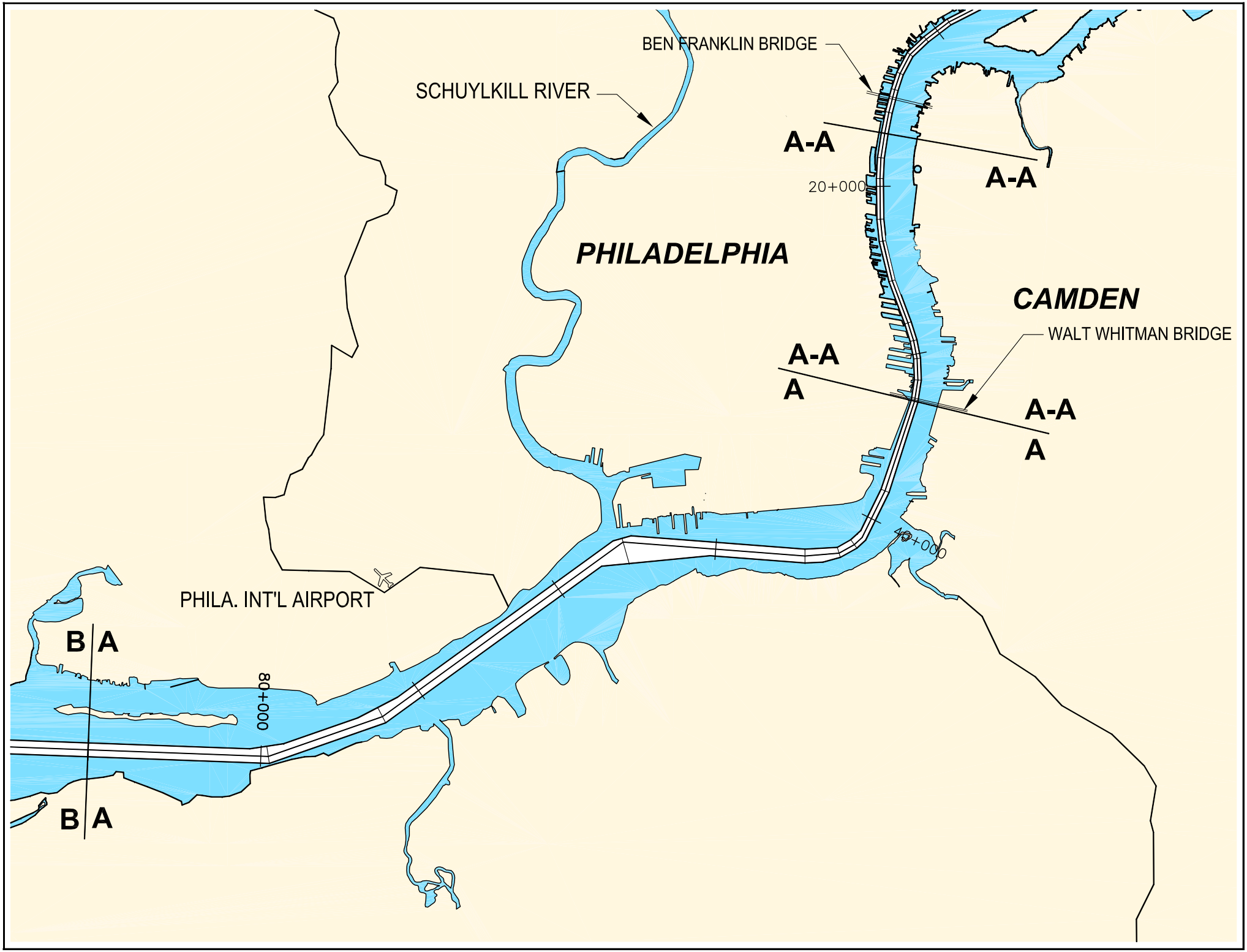
If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information referenced above properly documents the status and location of the utilities. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

PBF ENERGY [O2(1)]

Utility O2 – 8” Natural Gas Pipeline
Depth of Cover Survey Report

Prepared for:

Spretz Resources, Inc.

3216 Steeple Point Place

Flower Mound, TX 75022

Depth of Cover Survey of the Paulsboro Refinery 8-Inch Pipeline Crossing Delaware River Paulsboro, New Jersey to Gibbs Point, Pennsylvania

May 9 and 10, 2011

Prepared by:

PCA Engineering, Inc.
57 Cannonball Road
P.O. Box 196
Pompton Lakes, NJ 07442

PCA Job No. 30871

June 3, 2011

Depth of Cover Survey

Paulsboro Refinery

8-Inch Pipeline Crossing

Delaware River

Paulsboro, NJ – Gibbs Point, PA

May 9 and 10, 2011

I. INTRODUCTION

Between May 9 and 10, 2011 PCA Engineering, Inc. performed a Depth of Cover/Hydrographic Survey of an 8-inch diameter natural gas pipeline river crossing. The segment of pipe (river crossing) is part of a natural gas pipeline connecting the TETCO Station in Philadelphia, Pennsylvania to the Paulsboro Refinery in Paulsboro, New Jersey owned by Paulsboro Refining Inc. The line crosses the Delaware River from Paulsboro, New Jersey to Gibbs Point, Pennsylvania at the southwest corner of the Philadelphia International Airport.

The purpose of this survey was to confirm the “depth of cover” over the pipe to assure that there have not been any significant changes in the river bottom along the route of the crossing. This survey will also be used in compliance with DOT regulations that require regular inspection of pipeline crossings in navigable rivers.

Utilizing existing “as built drawings” current depth measurements were used to determine the depth of cover over the crossing and to compare it to previous survey measurements.

II. PIPELINE CROSSING DESCRIPTION

The crossing is part of the Paulsboro Refinery (previously Valero) Natural Gas Distribution pipeline from the TETCO Station in Philadelphia, Pennsylvania that provides product to the Paulsboro Refinery in Paulsboro, New Jersey. The pipe through the crossing is an 8-inch diameter carbon steel pipe approximately 4,500 feet long exposed on the south side of the crossing at the manifold in the refinery.

On the north side of the crossing (Philadelphia) the pipe continues underground through the Philadelphia Airport to the TETCO Pumping Station.

The current shipping channel is maintained to 40 feet below MLW with proposals (not active) to lower it to 45 feet below MLW. The pipeline is more than 50 feet below MLW through the channel. The attached drawing shows the current river bottom and the location of the pipe below the channel bottom.

The type of coating shown on the existing drawings – “Ragged on Hot Asphalt”. The pipe is protected by an active cathodic protection system, which was also inspected

II. PIPELINE CROSSING DESCRIPTION (Cont'd)

in conjunction with this survey. The cathodic protection system is maintained by Buckeye Pipeline Co. that has additional pipes in the area that are electrically contiguous with the Paulsboro line.

Drawings that were used as reference for this survey were Mobil U.S. Marketing & Refinery" Delaware River Crossings #D-878-881 dated 1995 (revised) and Valero Refining Company Drawing No. STV-01.

The crossing is exposed and marked with a crossing sign on the south side of the river in the fenced in manifold area. The pipe is not exposed on the north side of the river; however, there is a test station within the airport property that could be used to contact the pipe if necessary. Due to airport restrictions it not practical to access this test station. It not used for this survey.

Due to the difficulty in using GPS world coordinate system (latitude/longitude) all survey points were converted to the New Jersey State Plane coordinate system (x and y) in preparation of this survey.

II. PIPELINE CROSSING DESCRIPTION (Cont'd)

The following NJ SPC #2900 NAD 83 coordinates were used for this survey. They were obtained from the existing drawings and confirmed by GPS measurements.

South Side – GIP (galvanized iron pipe) within the fenced in manifold

N370,167.33 E279,184.26 (converted from Delaware River System). Information provided by the U.S. Army Corps of Engineers (Philadelphia). Elevation at the top of the pipe –10.23' above MLW.

North Side

No markers were found. Pipe location from Valero Refining Company DWG. NO. STV-01. Pipeline Crossing Sign is located over the north end of the crossing.
N374,232.412 E279,561.101 (SPC PA –S converted to SPC- NJ 2900 NAD 83 coordinate system.

III. SURVEY PROCEDURE

The survey was performed using an "Odom" Model Echotrac CVM survey fathometer with built in Trimble DGPS receiver. A dual frequency transponder 200/24 Hz was used to obtain sounding measurements. Precise horizontal control was obtained with the Trimble receiver that utilized realtime corrections from a local COR station.

III. SURVEY PROCEDURE (Cont'd)

"Global Mapper" and "Hypack Survey" software were used to assist in collecting the field data and post processing the information for tidal corrections. "Global Mapper" was used to keep the survey boat on line for the collection of the depth soundings.

Using the known end points of the crossing, a boat with the survey equipment traveled over the pipe and depth measurements and GPS coordinates were collected and recorded each second. At least three passes were made over the pipe and parallel to it and numerous passes were made perpendicular to the pipe extending approximately 100 feet to the east and west of the center of the pipe.

The information that was gathered was used to produce a hydrographic profile of the crossing consisting of a continuous plot of depths along the length of the crossing. The "as built" depth of the pipe taken from the drawings was plotted along the length of the crossing profile using the same datum measured from MLW. The attached drawing shows the elevation of the river bottom and the elevation of the pipe when it was built. There is a Table of

III. SURVEY PROCEDURE (Cont'd)

Elevations below the profile that includes the current river bottom, the pipe crossing as built, and the results of the previous surveys made in 1997, 1999 and 2006. The readings are shown every 100 feet beginning from the south river bank. Station 4+35 is a GIP (galvanized iron pipe) level with the ground in the center of the south crossing sign. The pipe was used both as a virtual benchmark and point on line to control the survey and is shown on the attached drawings.

Details

Additional information and procedures were used to process the collected field data.

Due to the existing conditions at the time of the survey, i.e. the rapid river current and security fences along the riverbank, the existing water levels were used and corrected to obtain accurate bottom soundings. In addition a recent survey made by the US Corps of Engineers in Feb. 2011 was used to compare and confirm the present survey data that was obtained on May 9-10, 2011. All this information was used to prepare the attached survey drawings.

III. SURVEY PROCEDURE (Cont'd)

Tide Corrections

The initial survey was made without reference to tide corrections. At the completion of the survey and in preparation of the survey drawings a "tide correction table" was made using the corrected "Daily Tide Predictions for Philadelphia, PA, station 8545240, the closest "corrected tide station to the survey site. This information was further corrected using the Billingsport tide station, Station ID 8538552, immediately north of the project site that publishes correction factors to be applied to the Philadelphia Tidal Station.

The final survey was compared to the survey soundings that were taken by the USACE (United States Army Corps of Engineers) in February 2011. This information discussed and confirmed by representatives of the local USACE field office.

IV. RESULTS

The survey confirms that the pipe is below the current channel dredge depth of 40' below MLW throughout the channel crossing and the pipe is below the river bottom in most areas.

IV. RESULTS (Cont'd)

The river channel is approximately 800 feet wide, from Station 8+74- 16+85 measured from the Paulsboro side of the river. The recognized channel is –40 feet MLLW.

There is one area in the channel and one outside of the channel in which the as-built depth of the pipe is very close to the existing river bottom. Although there is no positive indication that the pipe is exposed the depth readings indicate the pipe maybe exposed.

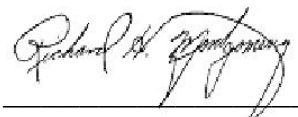
In the channel, in the area of Station 12+68 the pipe and the bottom are at elevation –56 feet +/-. This is well below the channel line and is not a concern. At Station 18+85 (outside the channel) the pipe rises to an elevation of –43 feet, which approximates the depth of the river at this point and is outside and below the channel line.

These locations as well as all other locations along the pipe are below the channel line and not considered a hazard to navigation.

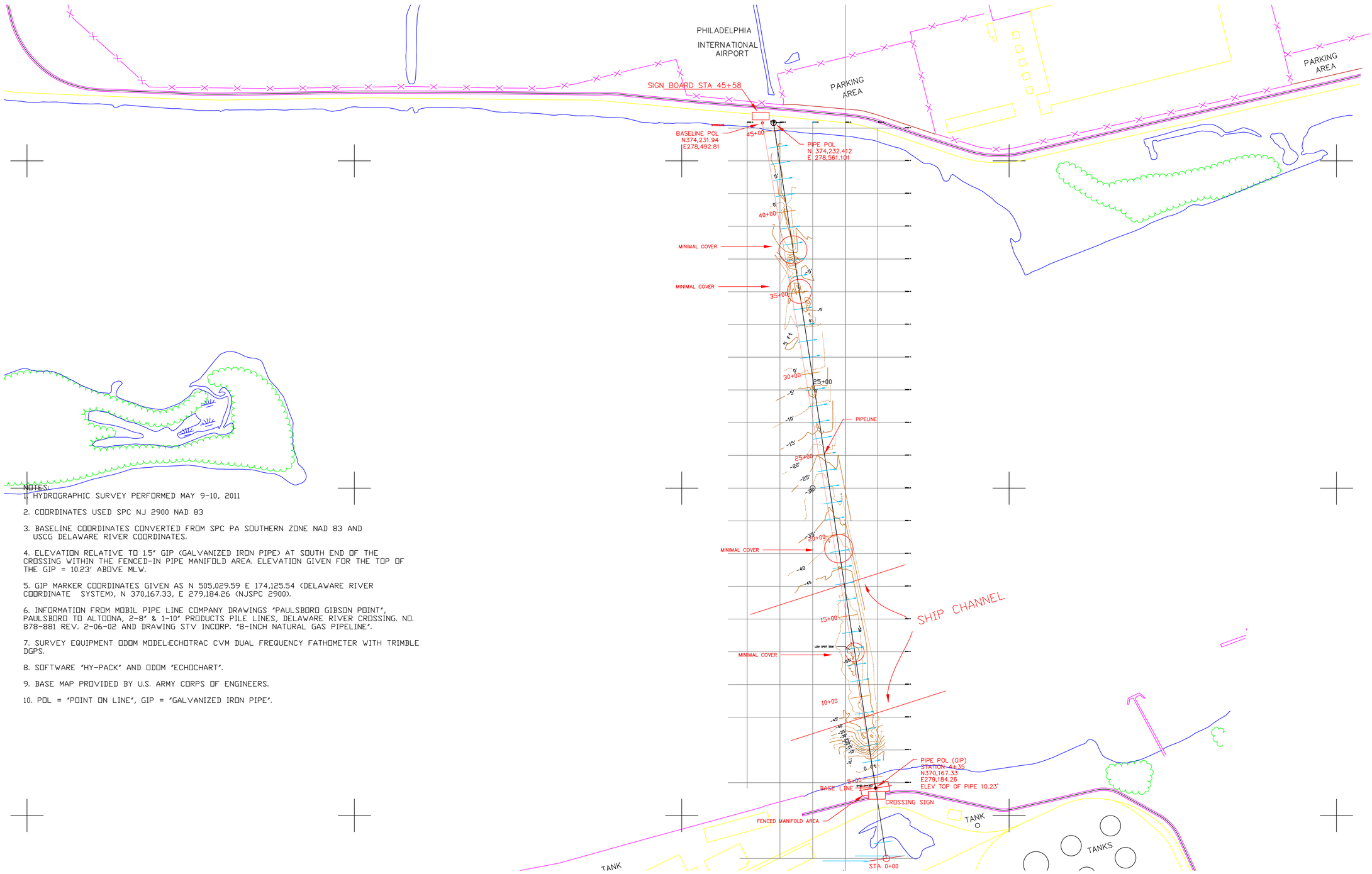
V. CONCLUSION

The survey confirms that the pipeline is not a hazard to navigation. For future surveys consider using Side Scan Sonar to provide an image of the bottom conditions along the pipe.

See Cathodic Protection Close Interval Survey (CIS) that accompanies this report.



RICHARD H. MONTGOMERY, P.E.
PCA ENGINEERING, INC.



NOTES:

1. HYDROGRAPHIC SURVEY PERFORMED MAY 9-10, 2011

2. COORDINATES USED SPC NJ 2900 NAD 83

3. BASELINE COORDINATES CONVERTED FROM SPC PA SOUTHERN ZONE NAD 83 AND USCG DELAWARE RIVER COORDINATES.

4. ELEVATION RELATIVE TO 1.5" GIP (GALVANIZED IRON PIPE) AT SOUTH END OF THE CROSSING WITHIN THE FENCED-IN PIPE MANIFOLD AREA. ELEVATION GIVEN FOR THE TOP OF THE GIP = 10.23' ABOVE MLW.

5. GIP MARKER COORDINATES GIVEN AS N 505,029.59 E 174,125.54 (DELAWARE RIVER COORDINATE SYSTEM), N 370,167.33, E 279,184.26 (NJSPC 2900).

6. INFORMATION FROM MOBIL PIPE LINE COMPANY DRAWINGS "PAULSBORO GIBSON POINT", PAULSBORO TO ALTOONA, 2-8" & 1-10" PRODUCTS PILE LINES, DELAWARE RIVER CROSSING. NO. 878-881 REV. 2-06-02 AND DRAWING STV INCORP. "8-INCH NATURAL GAS PIPELINE".

7. SURVEY EQUIPMENT ODOM MODEL:ECHOTRAC CVM DUAL FREQUENCY FATHOMETER WITH TRIMBLE DGPS.

8. SOFTWARE "HY-PACK" AND ODOM "ECHOCHART".

9. BASE MAP PROVIDED BY U.S. ARMY CORPS OF ENGINEERS.

10. POL = "POINT ON LINE", GIP = "GALVANIZED IRON PIPE".

PCA ENGINEERING, INC.
57 Cannonball RD. Pompton Lakes, NJ
TEL. (973) 616-4501

SPRETZ RESOURCES

PROJECT LOCATION: PAULSBORO ENERGY
PAULSBORO, N.J.

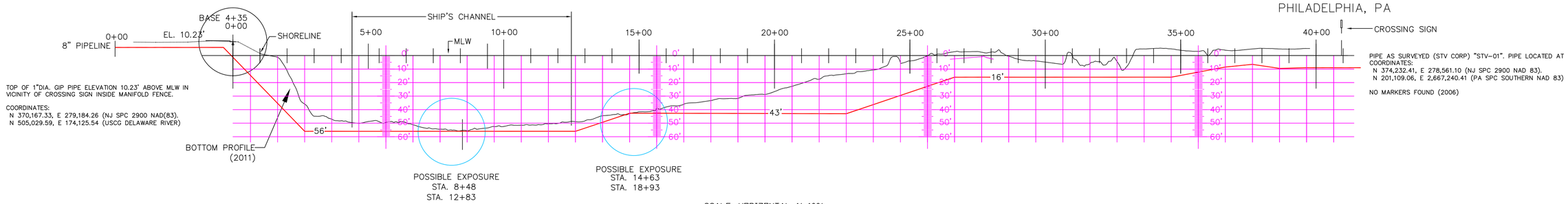
DRAWING TITLE: DELAWARE RIVER CROSSING
8" NATURAL GAS PIPELINE
PLAN

DESIGNED BY:		DRAWN BY: R.H.M.	DRAWING NO.
CHECKED BY: R.H.M.		SCALE: AS NOTED	DRAWING #30871-01
REVISION: 0		DATE: MAY 20, 201	

SOUTH SHORE
PAULSBORO, N.J.

PROFILE OF PIPE CROSSING
(2011)

NORTH SHORE
GIBSON POINT
PHILADELPHIA, PA



SCALE: HORIZONTAL 1"=100'
VERTICAL 1"=0.2"

	4+35						10+00						20+00												30+00									40+00					45+00
		500	600	700	800	900		1100	1200	1300	1400	1500	1600	1700	1800	1900		2100	2200	2300	2400	2500	2600	2700	2800	2900		3100	3200	3300	3400	3500	3600	3700	3800	3900		4100	4200	4300	4400	
Pipeline "As Built"	-6.0	5.0		56.0										56.0		43.0								43.0				19.0	16.0							16.0	14.0			7.0	10.0	10.0
Survey Sept, 1997				30	48.6	50.6		52.1	54.3		52.4		51		46			37.8			32.1				13.6	23					6		12.1					26			
Survey October 1999				31.2	48	48.4		50.6	50.4		52.8		50		45.5			38			33.3				11.3	24	2	0.5			5.4		11.1					2			
Survey July 2006	-10.2	-4.9	3.9	37.2	48.6	49.7	51.8	49.8	50.6	55.8	53.2	52	51.7	48.3	44.2	43.1	41	37.3	32.8	33.3	28.5	24	18.5	14.5	12.6	6.1	0.6	1.7	0.9	4.4	7.5	1.1	13.2	12.6	1.1	7.7	4.7	3.2	1.7	0.4	-0.6	-3.2
Survey May 10, 2011(Corr)	-10.4	-10.4	1.3	35.9	47	50.1	49.4	51.2	54.4	55.6	52.5	51.5	50.5	48.9	44.6	43	38.7	36	33.3	31.6	28.8	22.7	17.5	13.4	10.6	5.3	-0.2	-2.8	-2.4	-0.5	-4	6.5	6	4.7	-4.9	-4.9	-3.1	-3.9	-4.9	-4.9	-5.2	-5.2

NOTES:
1. HYDROGRAPHIC SURVEY PERFORMED MAY 9-10, 2011

2. COORDINATES USED SPC NJ 2900 NAD 83

3. AS-BUILT COORDINATES CONVERTED FROM SPC PA SOUTHERN ZONE NAD 83 AND USCG DELAWARE RIVER COORDINATES.

4. AS-BUILT ELEVATIONS PER PLANS. BOTTOM PROFILE IS RELATIVE TO PIPE (POL) ON THE SOUTH END OF THE CROSSING. PIPE 1.5" GIP (GALVANIZED IRON PIPE) AT SOUTH END OF THE CROSSING WITHIN THE FENCED-IN PIPE MANIFOLD AREA. ELEVATION GIVEN FOR THE TOP OF THE GIP = 10.23' ABOVE MLW.

5. GIP MARKER COORDINATES GIVEN AS N 505,029.59 E 174,125.54 (DELAWARE RIVER COORDINATE SYSTEM), N 370,167.33, E 279,184.26 (NJSPC 2900).

6. DEPTH MEASUREMENTS POST PROCESSED FROM PHILADELPHIA TIDE STATION PUBLISHED TIDES (CORRECTED) AND TRANSLATED TO BILLINGSPORT DATA LEVELS.

7. INFORMATION FROM MOBIL PIPE LINE COMPANY DRAWINGS "PAULSBORO GIBSON POINT", PAULSBORO TO ALTOONA, 2-8" & 1-10" PRODUCTS PILE LINES, DELAWARE RIVER CROSSING. NO. 878-881 REV. 2-06-02 AND DRAWING STV INCORP. "8-INCH NATURAL GAS PIPELINE".

8. SURVEY EQUIPMENT ODOM ECHOTRAC CVM W/ BUILT IN TRIMBLE DGPS RECEIVER.

9. SOFTWARE "HY-PACK" AND "GLOBAL MAPPER".

PCA ENGINEERING, INC.
57 CANNONBALL ROAD POMPTON LAKES, NJ
TEL. (973) 616-4501

SPRETZ RESOURCES

PROJECT LOCATION: PAULSBORO ENERGY
PAULSBORO, N.J.

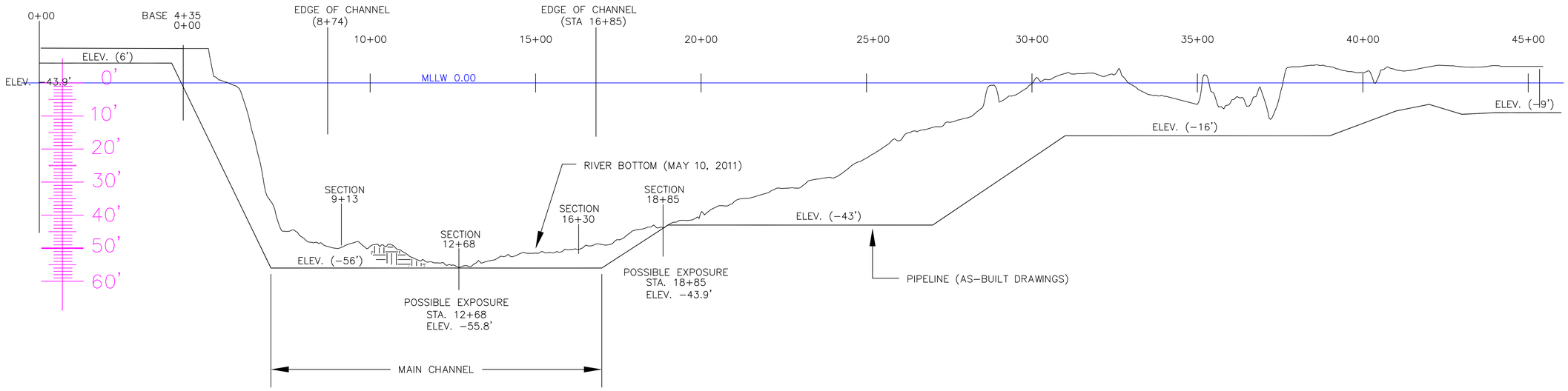
DRAWING TITLE: HYDROGRAPHIC SURVEY
DELAWARE RIVER CROSSING
8" NATURAL GAS PIPELINE

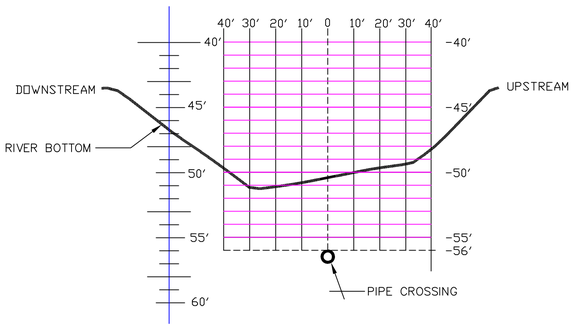
DESIGNED BY:	
DRAWN BY:	R.H.M.
CHECKED BY:	R.H.M.
SCALE:	AS NOTED
REVISION:	0
DATE:	MAY 18, 2011

DRAWING NO.
DRAWING #D-30871-2

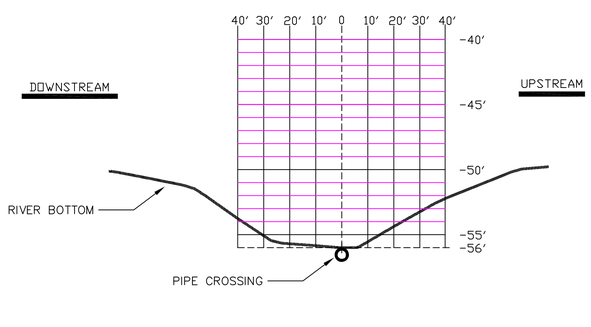
PAULSBORO, NJ

PHILADELPHIA, PA

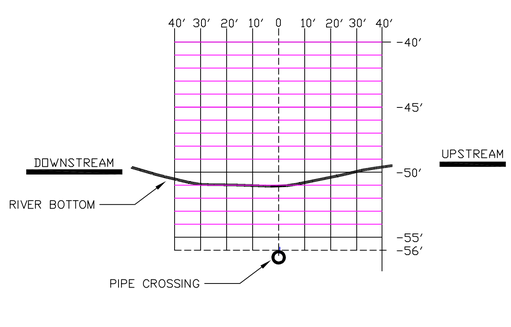




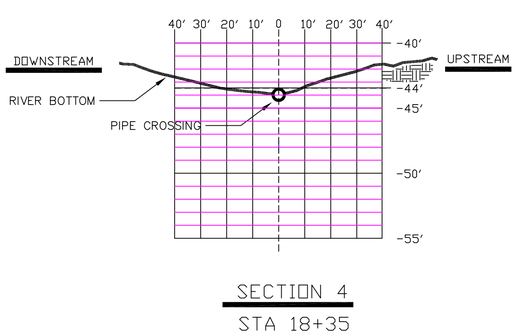
SECTION 1
STA 9+13
(IN CHANNEL)



SECTION 2
STA 12+68
(IN CHANNEL)



SECTION 3
STA 16+30
(IN CHANNEL)



SECTION 4
STA 18+35
(OUTSIDE CHANNEL)

1 SCALE AS SHOWN
2 STATIONS FROM ORIGINAL 0+00
3 SHORELINE AT STA. 4+35

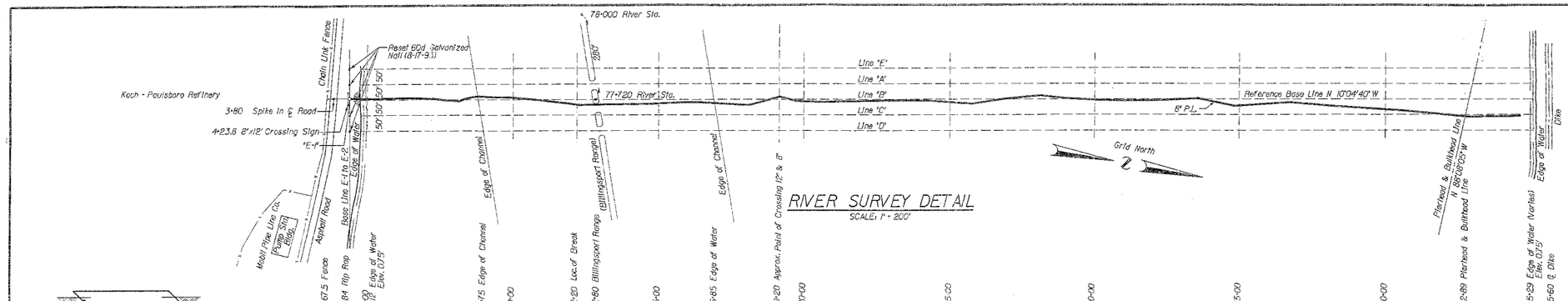
PCA ENGINEERING, INC. 57 CANNONBALL ROAD POMPTON LAKES, NJ TEL. (973) 616-4501	SPRETZ RESOURCES	PROJECT LOCATION: PAULSBORO ENERGY PAULSBORO, N.J.	DRAWING TITLE: HYDROGRAPHIC SECTONS DELAWARE RIVER CROSSING 8" NATURAL GAS PIPELINE	DESIGNED BY: CHECKED BY: R.H.M. REVISION: 0	DRAWN BY: R.H.M. SCALE: AS NOTED DATE: MAY 18, 2011	DRAWING NO. DRAWING #D-30871-3

PBF ENERGY [02(2)]

Utility O2 – 8” Natural Gas Pipeline
Hydrographic Profile Drawings

PIPE LINE LOCATION

LOCATION	STATION	8" PIPE LINE
Nov.9 1	6+96	On Line
3	7+75	4' East
2	8+09	5' East
4	8+78	5' West
5	9+45	6' West
6	10+43	On Line
8	12+21	2.5' East
Nov.8 5	13+79	20' East
6	14+57	19' East
7	16+23	12' East
8	17+04	17' East
Nov.10 3	18+17	2.3' East
Nov.9 10	19+16	5' West
Nov.10 2	19+46	On Line
1	19+79	10' East
5	21+89	5' East
7	24+03	7' West
8	25+72	19' East
9	26+96	On Line
10	28+15	8' West
11	29+36	On Line
12	30+28	9' East
13	31+13	9' East
14	31+80	6' East
15	32+88	On Line
16	33+55	On Line
17	34+84	30' East
18	35+63	23' East
19	36+88	14' East
20	38+33	25' East
21	40+13	40' East
22	41+45	52' East
23	42+89	63' East
24	44+52	64' East

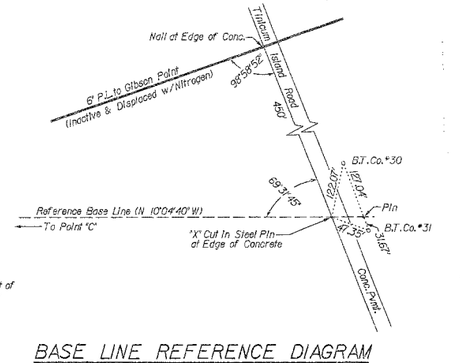


PIPE DETAILS
NO SCALE

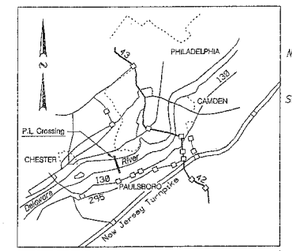
T.B.M. No. 2 50d Nail Set 1.0' High at West Side Power Pole, 20± East of Sta. 4+20 Elev. 11.28' (Fnd. 10-04-01)

T.B.M. No. 3 Top of 1" ϕ G.I.P. Set In Conc. at Ground Level Sta. 4+35 Elev. 10.28' (Fnd. Distrubed 10-04-01, Elev. 10.23')

T.B.M. No. 4 Top of 1.5' Wide Steel Piling 3.0' East of Ch. Lk. Fc. Cor. 300'(±) West of X-ing at Water Edge Sta. 5+03 Elev. 11.71' (Fnd. 10-04-01)



BASE LINE REFERENCE DIAGRAM
NO SCALE



VICINITY MAP
SCALE: 1" = 7.5 Miles

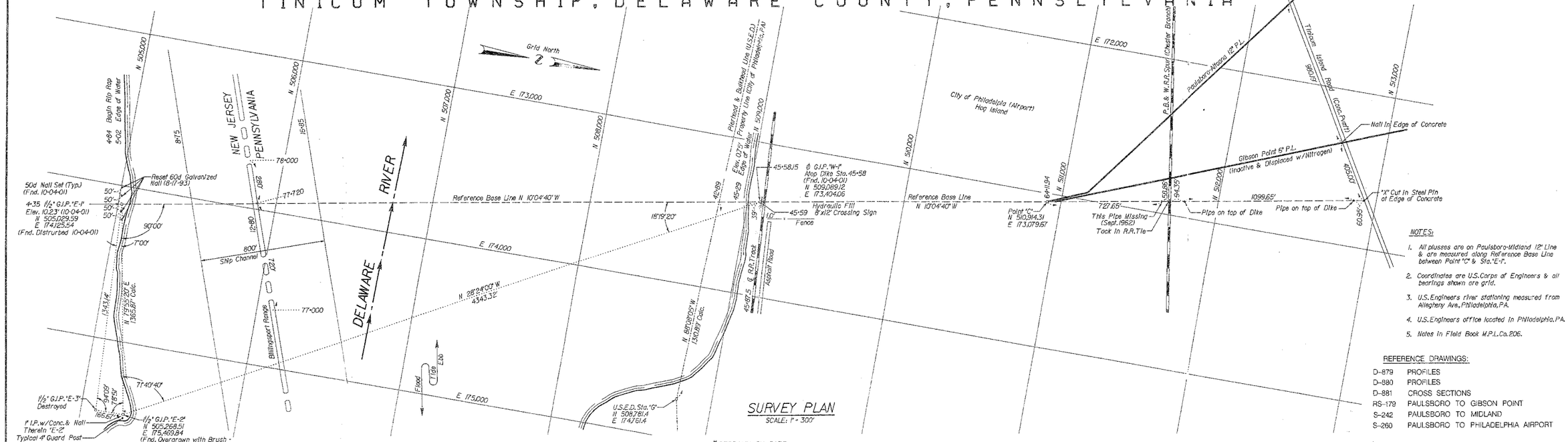
Directions to Crossing

North Bank: Start Philadelphia Int. Airport to East & South Side to end Asphalt Road & Airport Fence. Walk Across R.R. Track & West 100 to Crossing.

South Bank: Enter Mobil Refinery at Gate 3, Guard Shack, off Billingsport Road In Paulsboro, NJ. Go West. North & East Through Tank Farm then North to River, East along River to Crossing.

Waterway: Boat Launch In Darby Creek, South on Darby to River. East on Delaware River 3± Miles to Lat. 39°51'05" N, Long. 75°15'35" W & Crossing.

TINICUM TOWNSHIP, DELAWARE COUNTY, PENNSLYLVANIA



SURVEY PLAN
SCALE: 1" = 300'

NOTES:

1. All plusses are on Paulsboro-Midland 12" Line & are measured along Reference Base Line between Point "C" & Sta. "E-1".
2. Coordinates are U.S. Corps of Engineers & all bearings shown are grid.
3. U.S. Engineers river stationing measured from Allegheny Ave., Philadelphia, PA.
4. U.S. Engineers office located in Philadelphia, PA.
5. Notes in Field Book M.P.L.Co. 206.

REFERENCE DRAWINGS:

D-879	PROFILES
D-880	PROFILES
D-881	CROSS SECTIONS
RS-179	PAULSBORO TO GIBSON POINT
S-242	PAULSBORO TO MIDLAND
S-260	PAULSBORO TO PHILADELPHIA AIRPORT

* REDRAWN ON CADD

NO.	REVISION	DATE	BY	CHK.	APP.
*6	REV. PER FIELD INSP. F.B. 788, PGS. 1-5 BY COB 7-13-95	8-95	RD		
7	REV. PER FIELD INSP. F.B. 598, PGS. 63-68 BY LDS & CEB	8-18-93	LDS	CEB	
11	FIELD INSP. FB. CB-55, PGS. 22-26 BY COB 10-04-01	2-06-02	RLD	COB	COB
12	FIELD INSP. FB. CB-19, PGS. 34-36 BY COB 10-06-99	3-24-00	JSB		
9	FIELD INSP. FB. CB-14, PGS. 49-50 BY COB 9-15-97	1-27-98	JSB		

DRAWING STATUS
AS PER 10-04-01 INSPECTION

Mobil U.S. Marketing & Refining
AMERICAS WHOLESALE ENGINEERING GROUP — DALLAS, TEXAS

DESIGN ENGINEER	JWT		APPROVED
DESIGN CHECK	CBM		
DRAWN BY	HCW		
DRAWING CHECK			DATE

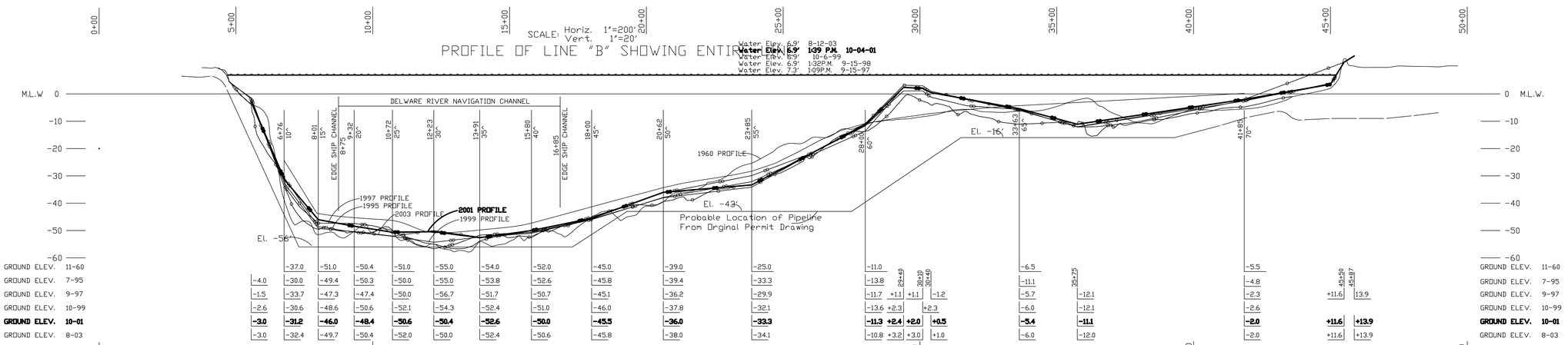
MOBIL PIPE LINE COMPANY
PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PILE LINES
DELAWARE RIVER CROSSING
PLAN

SCALE	DRAWING No.	SHEET	REV. No.
AS NOTED	D-878	1 OF 1	11

PROFILE OF LINE "B" SHOWING ENTIRE CHANNEL

SCALE: Horiz. 1"=200'
Vert. 1"=20'

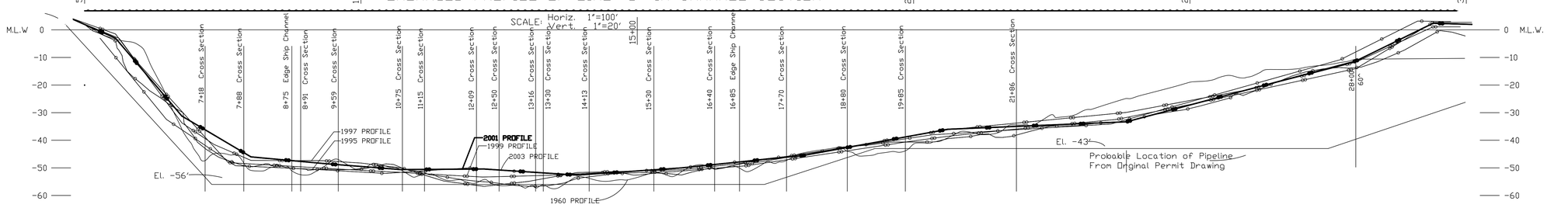
Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39 P.M. 10-04-01
Water Elev. 6.9' 10-6-99
Water Elev. 6.9' 1:32P.M. 9-15-98
Water Elev. 7.3' 1:09P.M. 9-15-97



GROUND ELEV.	11-60		-37.0	-51.0	-50.4	-51.0	-55.0	-54.0	-52.0	-45.0	-39.0	-25.0	-11.0			-6.5		-5.5			GROUND ELEV.	11-60
GROUND ELEV.	7-95	-4.0	-30.0	-49.4	-50.3	-50.0	-55.0	-53.8	-52.6	-45.8	-39.4	-33.3	-13.8	22+49	28+10 28+49	-11.1	35+75	-4.8	45+50	45+87	GROUND ELEV.	7-95
GROUND ELEV.	9-97	-1.5	-33.7	-47.3	-47.4	-50.0	-56.7	-51.7	-50.7	-45.1	-36.2	-29.9	-11.7	+1.1	+1.1 -1.2	-5.7	-12.1	-2.3	+11.6	13.9	GROUND ELEV.	9-97
GROUND ELEV.	10-99	-2.6	-30.6	-48.6	-50.6	-52.1	-54.3	-52.4	-51.0	-46.0	-37.8	-32.1	-13.6	+2.3	+2.3	-6.0	-12.1	-2.6			GROUND ELEV.	10-99
GROUND ELEV.	**10-01**	**-3.0**	**-31.2**	**-46.0**	**-48.4**	**-50.6**	**-50.4**	**-52.6**	**-50.0**	**-45.5**	**-36.0**	**-33.3**	**-11.3**	**+2.4**	**+2.0 +0.5**	**-5.4**	**-11.1**	**-2.0**	**+11.6**	**+13.9**	**GROUND ELEV.**	**10-01**
GROUND ELEV.	8-03	-3.0	-32.4	-49.7	-50.4	-52.0	-50.0	-52.4	-50.6	-45.8	-38.0	-34.1	-10.8	+3.2	+3.0 +1.0	-6.0	-12.0	-2.0	+11.6	+13.9	GROUND ELEV.	8-03

ENLARGED PROFILE OF LINE "B" IN CHANNEL SECTION

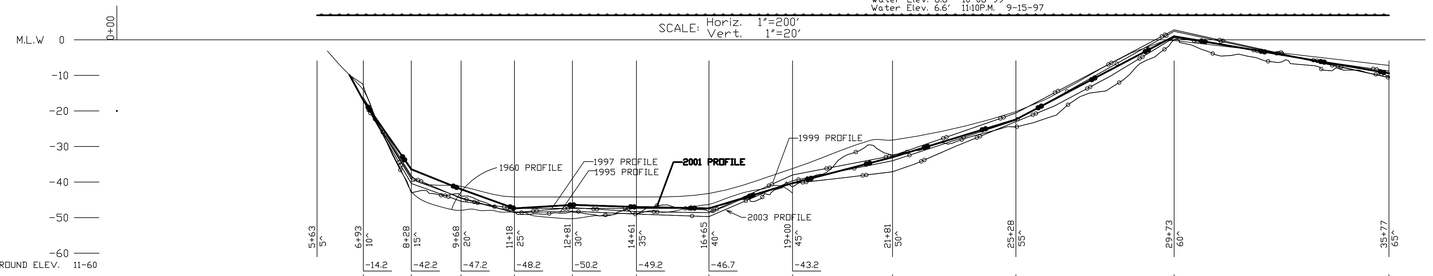
SCALE: Horiz. 1"=100'
Vert. 1"=20'



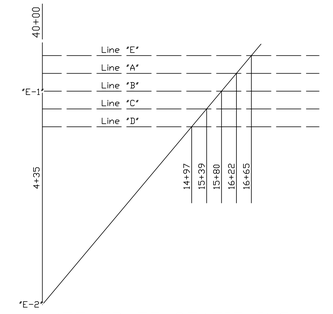
PROFILE OF CHECK LINE

Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39P.M. 10-04-01
Water Elev. 6.6' 10-06-99
Water Elev. 6.6' 1:10P.M. 9-15-97

SCALE: Horiz. 1"=200'
Vert. 1"=20'



GROUND ELEV.	11-60	-14.2	-42.2	-47.2	-48.2	-50.2	-49.2	-46.7	-43.2					
GROUND ELEV.	7-95	-13.0	-43.0	-44.0	-48.2	-48.4	-49.0	-48.5	-41.4	-32.4	-24.5	0.0		-10.4
GROUND ELEV.	9-97	-17.2	-40.4	-45.4	-47.4	-47.4	-47.4	-47.4	-40.4	-37.1	-23.0	+0.6		-8.8
GROUND ELEV.	10-99	-17.0	-38.6	-44.6	-48.6	-47.2	-48.3	-48.6	-38.0	-32.6	-20.6	+2.8		-10.6
GROUND ELEV.	**10-01**	**-17.0**	**-36.4**	**-42.0**	**-47.4**	**-46.4**	**-47.0**	**-47.4**	**-40.3**	**-33.0**	**-22.4**	**+1.0**		**-9.4**
GROUND ELEV.	8-03	-17.0	-39.2	-44.4	-48.6	-48.2	-49.0	-49.7	-39.6	-34.0	-22.6	+2.4		-10.6



METHOD OF STATIONING
CHECK PROFILE

1960 PROFILE
1995 PROFILE
1997 PROFILE
1999 PROFILE
2001 PROFILE
2003 PROFILE

FILL
EROSION

REFERENCE DRAWINGS:

D-878	PLAN
D-880	PROFILES
D-881	CROSS SECTIONS
RS-179	PAULSBORO TO GIBSON PT. 2-8" & 1-10" P.L.

11	Rev. Per Field Insp. F.B. CB-55, Pgs. 22-26, By COB 10-04-01	2-06-02	RLH	COB	COB
10	Rev. Per Field Insp. F.B. CB-19, Pgs. 34-36, By COB 10-06-99	10-99	GKT	ISB	
9	Rev. Per Field Insp. F.B. CB-14, Pgs. 49-50, By COB 9-15-97	1-98	ISB		
13	Drawing Revision of 8-12-03 Insp. by Buzzard Surveying, Inc.	1-05	GJM		COB
12	Field Insp. By Hudson Engineering 8-12-03				

AS PER 8-12-03
INSPECTION

JWT
TMC / WJP 11-3-93
CEM

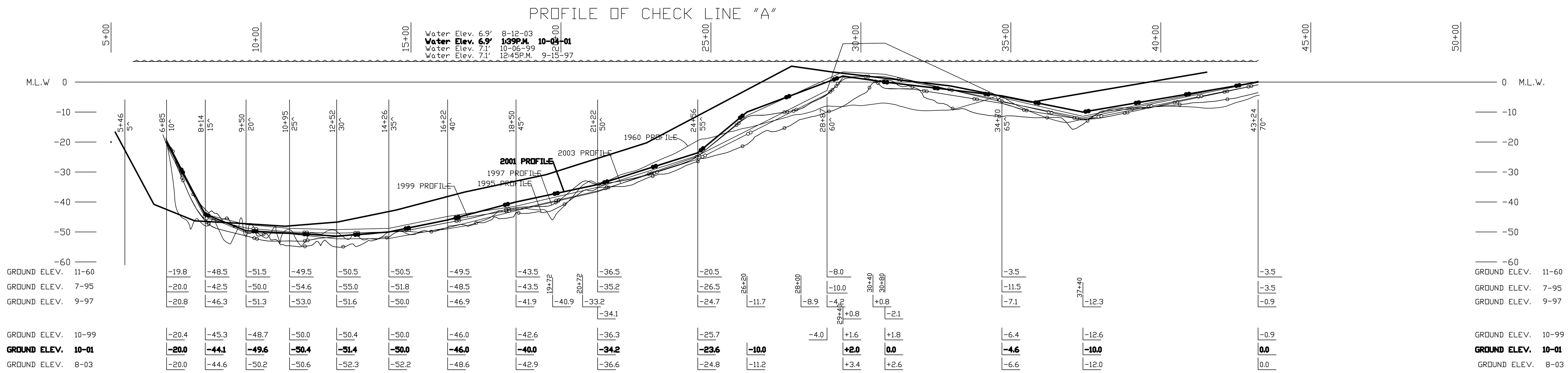
FIRST ORIGINAL SIGNED BY:
G.T.J.
3-17-61

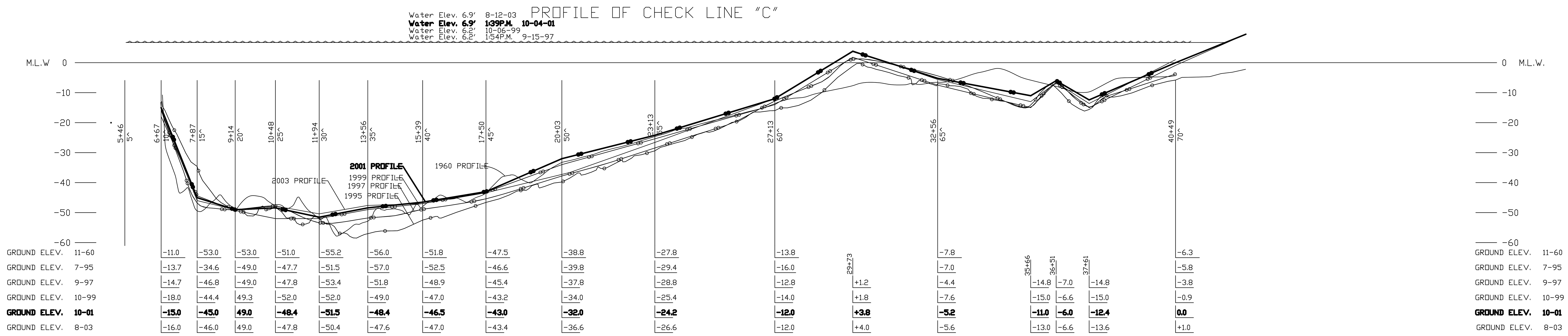
AS NOTED

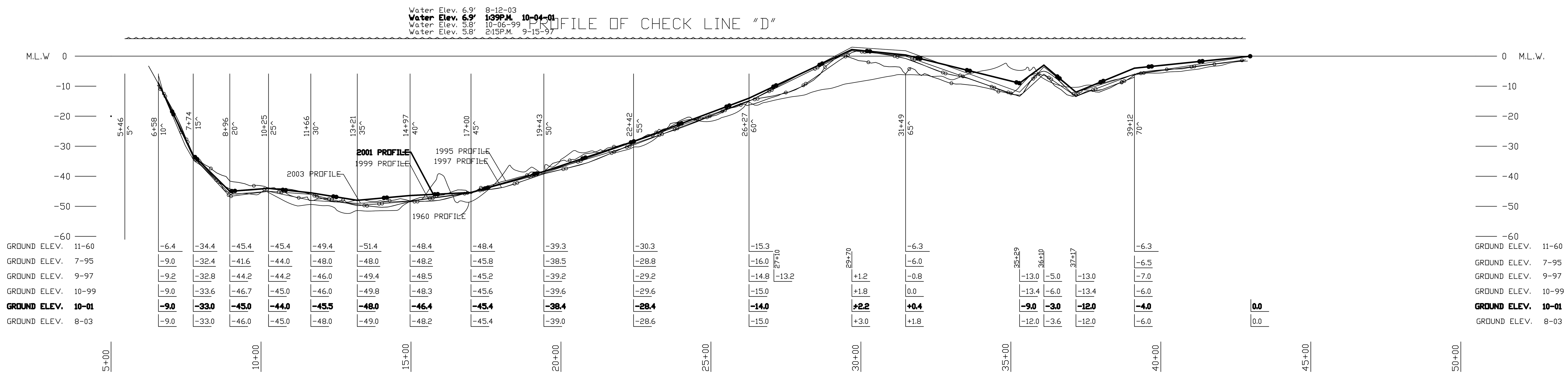
PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PIPELINES
DELAWARE RIVER CROSSING
PROFILES

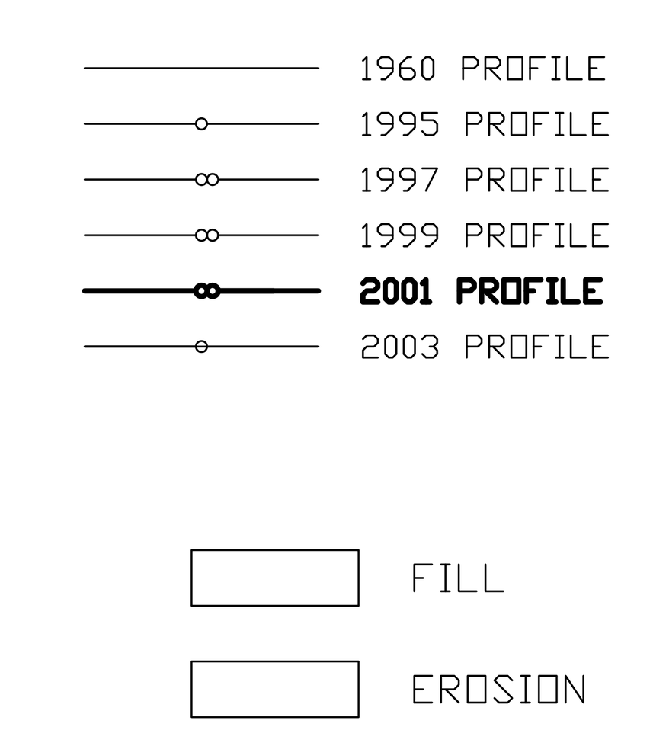
D-879 CAD MAP

13


PROFILE OF CHECK LINE "A"
Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39P.M. 10-04-01
Water Elev. 7.1' 10-06-99
Water Elev. 7.1' 12:45P.M. 9-15-97
M.L.W. 0
1960 PROFILE
2003 PROFILE
2001 PROFILE
1997 PROFILE
1999 PROFILE
1995 PROFILE
GROUND ELEV. 11-60 -19.8 -48.5 -51.5 -49.5 -50.5 -50.5 -49.5 -43.5 -36.5 -20.5 -8.0 -3.5 -3.5
GROUND ELEV. 7-95 -20.0 -42.5 -50.0 -54.6 -55.0 -51.8 -48.5 -43.5 -35.2 -26.5 -10.0 -11.5 -3.5
GROUND ELEV. 9-97 -20.8 -46.3 -51.3 -53.0 -51.6 -50.0 -46.9 -41.9 -40.9 -33.2 -34.1 -24.7 -11.7 -8.9 -4.2 +0.8 +0.8 -2.1 -7.1 -12.3 -0.9
GROUND ELEV. 10-99 -20.4 -45.3 -48.7 -50.0 -50.4 -50.0 -46.0 -42.6 -36.3 -25.7 -4.0 +1.6 +1.8 -6.4 -12.6 -0.9
GROUND ELEV. 10-01 -20.0 -44.1 -49.6 -50.4 -51.4 -50.0 -46.0 -40.0 -34.2 -23.6 -10.0 +2.0 0.0 -4.6 -10.0 0.0
GROUND ELEV. 8-03 -20.0 -44.6 -50.2 -50.6 -52.3 -52.2 -48.6 -42.9 -36.6 -24.8 -11.2 +3.4 +2.6 -6.6 -12.0 0.0


PROFILE OF CHECK LINE "C"
Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39P.M. 10-04-01
Water Elev. 6.2' 10-06-99
Water Elev. 6.2' 1:54P.M. 9-15-97
M.L.W. 0
2001 PROFILE
1999 PROFILE
1997 PROFILE
1995 PROFILE
2003 PROFILE
1960 PROFILE
GROUND ELEV. 11-60 -11.0 -53.0 -53.0 -51.0 -55.2 -56.0 -51.8 -47.5 -38.8 -27.8 -13.8 -7.8 -6.3
GROUND ELEV. 7-95 -13.7 -34.6 -49.0 -47.7 -51.5 -57.0 -52.5 -46.6 -39.8 -29.4 -16.0 -7.0 -5.8
GROUND ELEV. 9-97 -14.7 -46.8 -49.0 -47.8 -53.4 -51.8 -48.9 -45.4 -37.8 -28.8 -12.8 +1.2 -4.4 -14.8 -7.0 -14.8 -3.8
GROUND ELEV. 10-99 -18.0 -44.4 49.3 -52.0 -52.0 -49.0 -47.0 -43.2 -34.0 -25.4 -14.0 +1.8 -7.6 -15.0 -6.6 -15.0 -0.9
GROUND ELEV. 10-01 -15.0 -45.0 49.0 -48.4 -51.5 -48.4 -46.5 -43.0 -32.0 -24.2 -12.0 +3.8 -5.2 -11.0 -6.0 -12.4 0.0
GROUND ELEV. 8-03 -16.0 -46.0 49.0 -47.8 -50.4 -47.6 -47.0 -43.4 -36.6 -26.6 -12.0 +4.0 -5.6 -13.0 -6.6 -13.6 +1.0


PROFILE OF CHECK LINE "D"
Water Elev. 6.9' 8-12-03
Water Elev. 6.9' 1:39P.M. 10-04-01
Water Elev. 5.8' 10-06-99
Water Elev. 5.8' 2:15P.M. 9-15-97
M.L.W. 0
2001 PROFILE
1999 PROFILE
1995 PROFILE
1997 PROFILE
2003 PROFILE
1960 PROFILE
GROUND ELEV. 11-60 -6.4 -34.4 -45.4 -45.4 -49.4 -51.4 -48.4 -48.4 -39.3 -30.3 -15.3 -6.3 -6.3
GROUND ELEV. 7-95 -9.0 -32.4 -41.6 -44.0 -48.0 -48.0 -48.2 -45.8 -38.5 -28.8 -16.0 -6.0 -6.5
GROUND ELEV. 9-97 -9.2 -32.8 -44.2 -44.2 -46.0 -49.4 -48.5 -45.2 -39.2 -29.2 -14.8 -13.2 +1.2 -0.8 -13.0 -5.0 -13.0 -7.0
GROUND ELEV. 10-99 -9.0 -33.6 -46.7 -45.0 -46.0 -49.8 -48.3 -45.6 -39.6 -29.6 -15.0 +1.8 0.0 -13.4 -6.0 -13.4 -6.0
GROUND ELEV. 10-01 -9.0 -33.0 -45.0 -44.0 -45.5 -48.0 -46.4 -45.4 -38.4 -28.4 -14.0 +2.2 +0.4 -9.0 -3.0 -12.0 -4.0 0.0
GROUND ELEV. 8-03 -9.0 -33.0 -46.0 -45.0 -48.0 -49.0 -48.2 -45.4 -39.0 -28.6 -15.0 +3.0 +1.8 -12.0 -3.6 -12.0 -6.0 0.0



SCALE: Horiz. 1"=200' Vert. 1"=20'

REFERENCE DRAWINGS:

D-878 PLAN
D-879 PROFILES
D-881 CROSS SECTIONS
RS-179 PAULSBORO TO GIBSON PT. 2-8" & 1-10" P.L.

11	Rev. Per Field Insp. FB. CB-55, Pgs. 22-26, By COB 10-04-01	2-06-02	RLH COB	COB
10	Rev. Per Field Insp. F.B. CB-19, Pgs. 34-36, By COB 10-06-99	3-24-00	GKT	ISB
9	Rev. Per Field Insp. F.B. CB-14, Pgs. 49-50, By COB 9-15-97	1-98	ISB	
13	Drawing Revision of 8-12-03 Insp. by Buzzard Surveying, Inc.	1-05	GJM	COB
12	Field Insp. by Hudson Engineering 8-12-03			

AS PER 8-12-03 INSPECTION

JWT

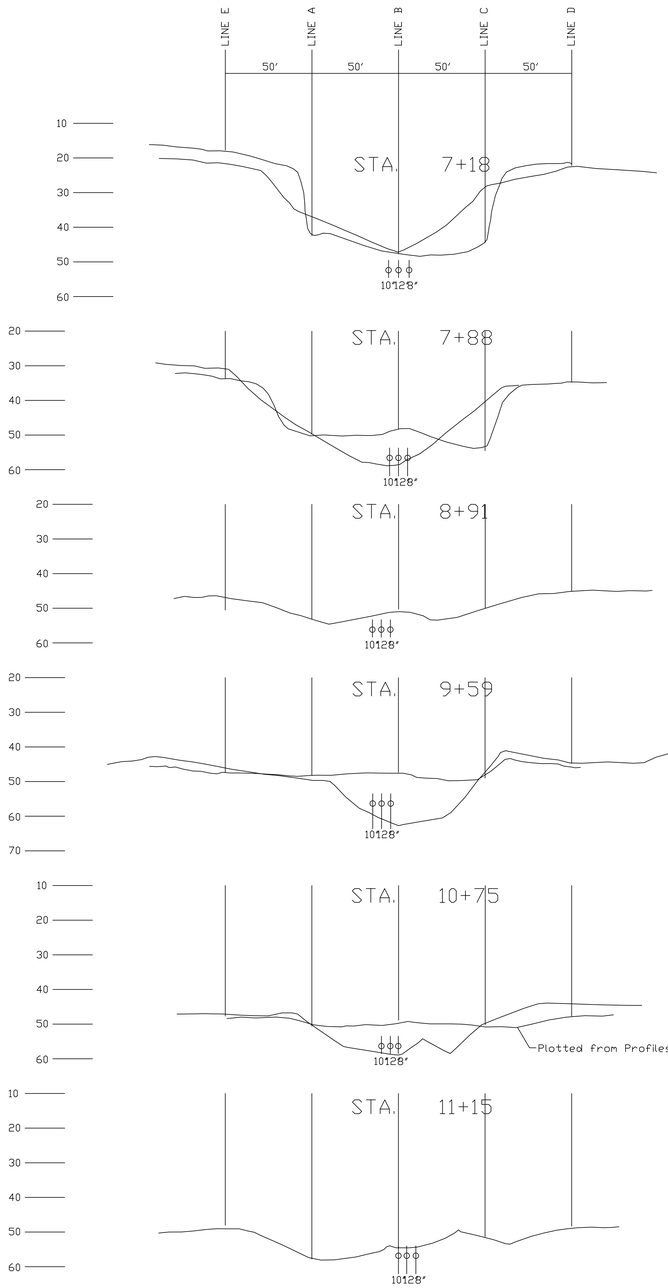
TMC / WJP 11-2-93

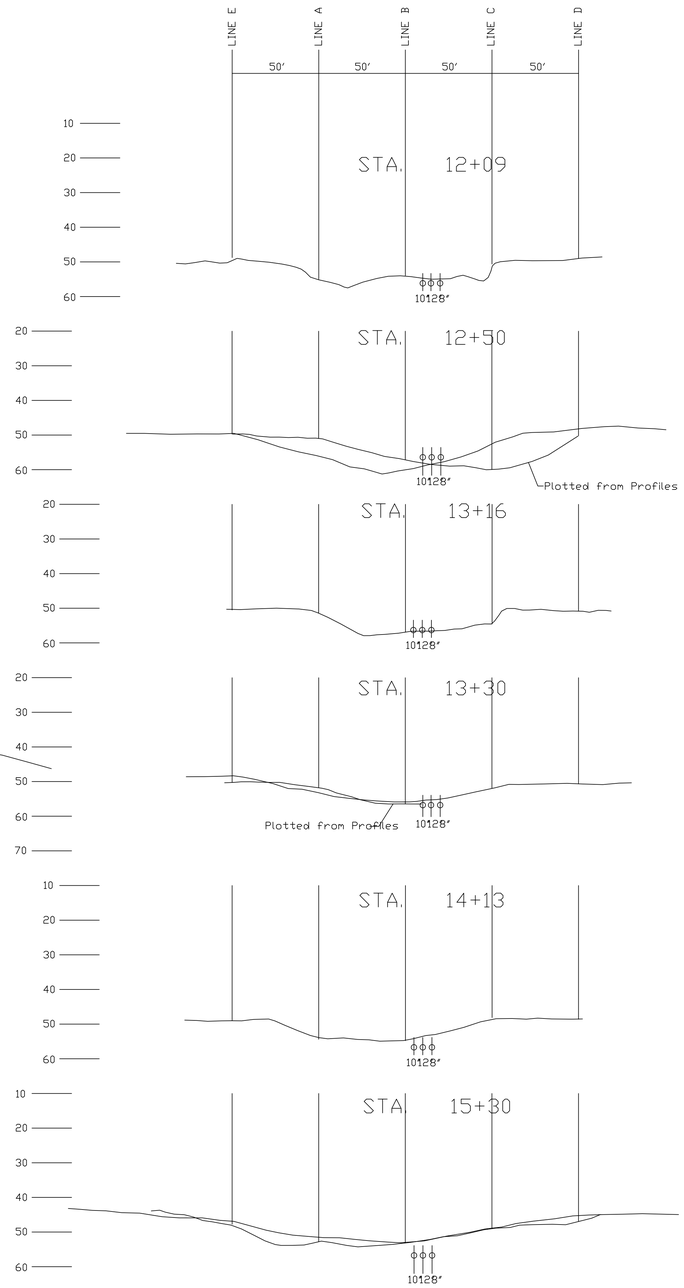
CEM

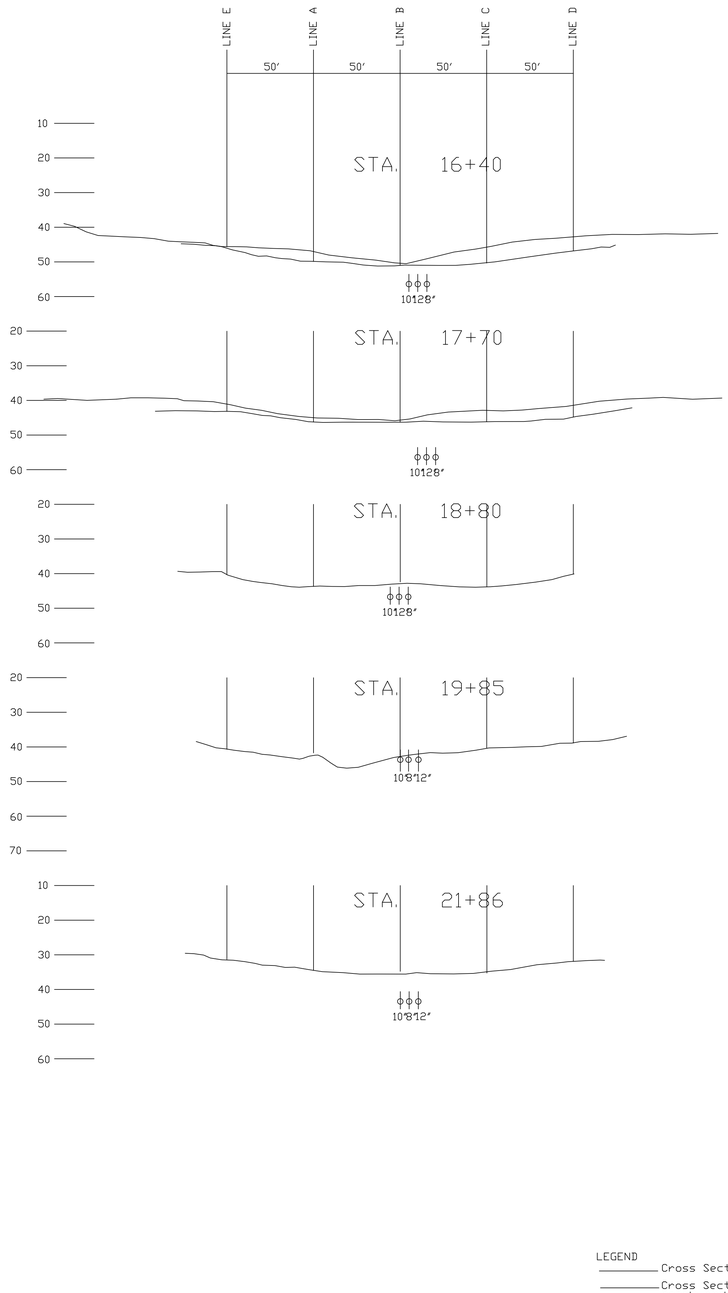
FIRST ORIGINAL SIGNED BY: G.T.J. 3-17-61

PAULSBORO TO GIBSON POINT
PAULSBORO TO ALTOONA
2-8" & 1-10" PRODUCTS PIPELINES
DELAWARE RIVER CROSSING
PROFILES

AS NOTED D-880 CAD MAP 13







LEGEND

Cross Sections of Nov. 1960 Survey made by M.P.L. Co.

Cross Sections of April 1958 Survey made prior to repair and backfill of pipe lines. Hydrography by Marine Surveys, Inc. and Missouri Valley Dredging Co.

NOTES:

1. 1-8″ Line is in 12″ Casing.
2. Pipe Lines shown in locations as determined by this survey but at elevations indicated on original permit drawings.

REFERENCE DRAWINGS:

D-1482-1-PL PLAN
D-1482-2-PLPROFILES
D-1482-3-PLPROFILES

AS PER 11-60 INSPECTION

JWT
CEM
TKL

1 REDRAWN ON CADD 8-95 RD

FIRST ORIGINAL SIGNED BY
G. J.
3-17-61

HORIZ. 1″=40′
VERT. 1″=20′

MOBIL PIPE LINE COMPANY
PAULSBORO TO GIBSON POINT
PAULSBORO TO MIDLAND
2-8″ & 1-10″ PRODUCTS PILE LINES
DELAWARE RIVER CROSSING
CROSS SECTIONS

D-881

CAD MAP 1 1 1

SUNOCO LOGISTICS

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 11, 2012

James Franciscus
Chief Right-of-Way Agent
Sunoco Pipeline L.P.
525 Fritztown Road
Sinking Spring, PA 19608

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Franciscus:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

You were initially contacted by me on November 1, 2011, to request information about known crossings within Reaches A-A and A. You identified and provided information for two utility lines (a directionally drilled pipeline bundle and a 12" pipeline) operated by Sunoco Logistics crossing the Delaware River within Reach A.

The as-built drawing you provided for the directionally drilled pipeline bundle (consisting of one 6" and three 8" pipelines) crossing the channel at approximately Channel Station 76+140 is attached. A review of the drawing shows:

- The tidal information shown on the drawing corresponds to the use of NGVD 1929 as the vertical datum.
- The minimum depth of the top of pipe crossing the channel appears to be -65' NGVD 1929.
- Conversion of the above depth to the project datum equates to -63.05' MLLW.

On March 7, 2012, I requested supplemental information from you to more accurately identify the location and depth of the 12" pipeline crossing. Attached is the information GBA currently has for the 12" pipeline operated by Sunoco Logistics and crossing the channel at approximately Channel Station 64+970. A review of the information prompts the following observations, questions and/or concerns:

- The information provided are documentation drawings, which were compiled from various reference drawings.
- The depth of the top of pipeline crossing the channel is shown at a uniform -60' DRD.
- This appears to be a permitted depth rather than an as-built depth, which would not exhibit such uniformity.
- Conversion of the above depth to the project datum equates to -60.9' MLLW.
- No as-built drawing has been provided.

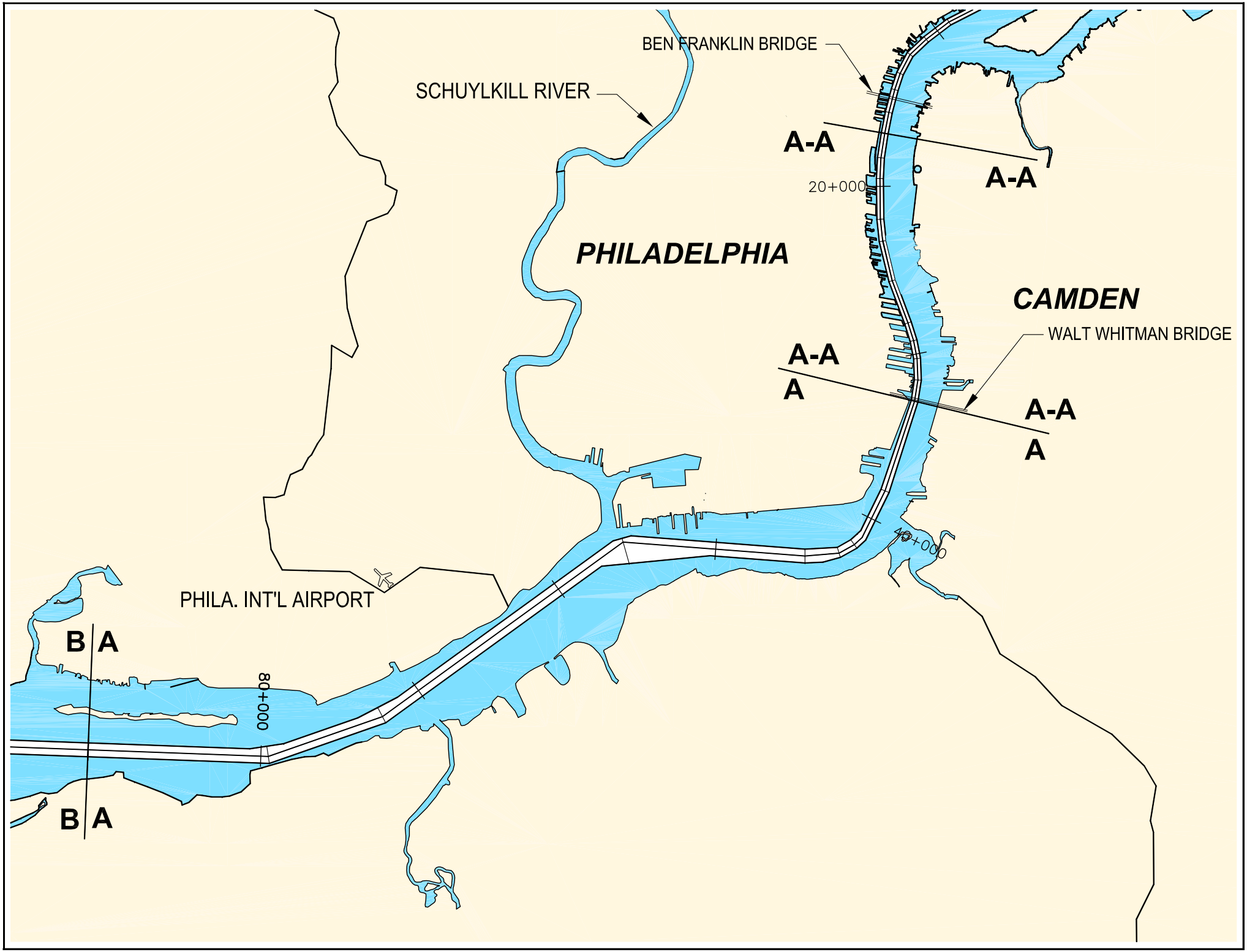
If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information referenced above properly documents the status and location of the utilities. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

Robert D. Henry

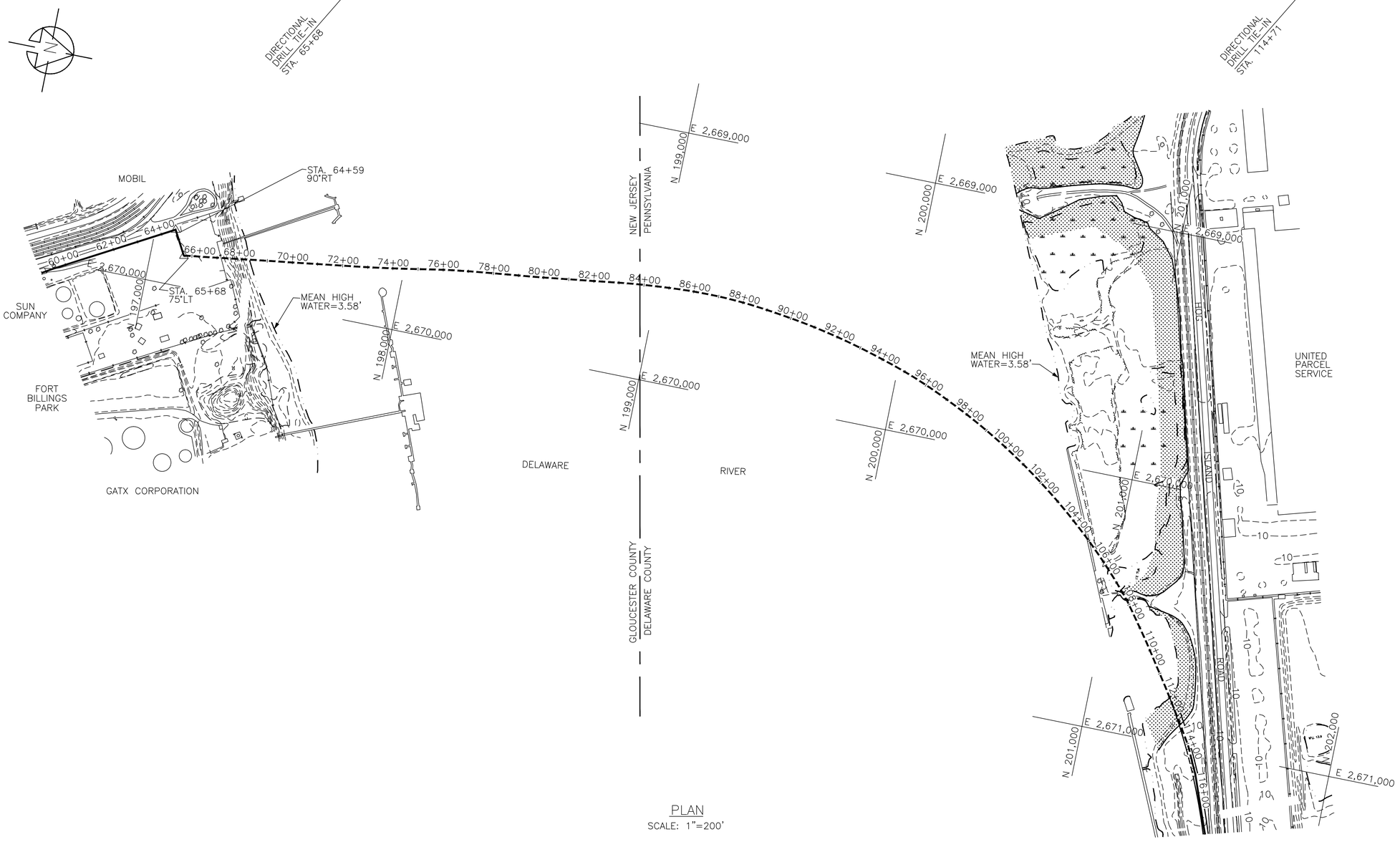
Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

SUNOCO LOGISTICS, LP (R)

Utility R – Directionally Drilled Pipeline Bundle (1-6” And 3-8” Pipelines) As-Built Drawings

DESIGNATION	MILE POST/AERIAL MARKER			
3N	DIA., WALL, GRADE, COATING	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II
4N	DIA., WALL, GRADE, COATING	6", .250" API5L ERW X42, SHAW YJ II	6", .280" API5L ERW X42, SHAW YJ II	6", .250" API5L ERW X42, SHAW YJ II
5N	DIA., WALL, GRADE, COATING	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II
JET FUEL	DIA., WALL, GRADE, COATING	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II	8", .322", API5L ERW X42, SHAW YJ II
	TEST STATION			



PLAN
SCALE: 1"=200'

GRAPHIC SCALE
1"=200'
200' 0 200' 400'

NOTES:

1. FOR LEGEND SEE COVER SHEET.
2. COORDINATE SYSTEM IS BASED ON PA STATE PLANE GRID (NAD 1983): VERTICAL DATUM USED NGVD 1929.
3. FOR DELAWARE RIVER PROFILE SEE DRAWING SP3-501.
4. TIDAL INFORMATION PREPARED FROM U.S. ARMY CORPS OF ENGINEERS. PHILADELPHIA, PENNSYLVANIA DISTRICT.
5. BASE MAPPING PREPARED FROM AERIAL PHOTOGRAPHY PREPARED BY AIR-OGRAPHY INC., DATED SEPTEMBER, 1992.
6. FLOOD BOUNDARIES PREPARED FROM FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR TINICUM TOWNSHIP, DELAWARE COUNTY, PA.
7. AS-BUILT INFORMATION FROM FLUOR DANIELS SURVEY DOCUMENTS SUBMITTED 12-5-94: AS-003 THRU AS-004.

   STATIONING IN SURVEY FIELD BOOKS DOES NOT CORESPOND WITH AS-BUILT DRAWINGS. USE STATIONING FOR DISTANCE COMPUTATION ONLY.
8. PIPELINE STATIONING IS THE ℄ OF PIPES. SEE DWG. SP3-117.

REFERENCE DRAWINGS

SP3-117	TRENCH CROSS-SECTIONS & DETAILS
SP3-501	DELAWARE RIVER DIRECTIONAL DRILL PROFILE
SHEET 1 OF 1	DELAWARE RIVER CONFORMED TO CONSTRUCTION (1)6.625"x.280" (3)8.625"x.322" MICHELS PIPELINE CONSTRUCTION INC. DATED 10-8-94 AND TANGENTIAL CALCULATIONS

UTILITY NOTE:

EXTREME CARE SHALL BE EXEROSED WHEN OPERATING NEAR EXISTING UTILITIES. THE CONTRACTOR SHALL EXPOSE EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL CONTACT THE PA ONE CALL SYSTEM (IN PENNSYLVANIA) OR THE GARDEN STATE UNDERGROUND PLANT LOCATION SERVICE (IN NEW JERSEY) A MINIMUM OF (3) THREE DAYS PRIOR TO ANY EXCAVATION WORK ASSOCIATED WITH THIS PROJECT. THE TELEPHONE NUMBERS ARE, PA ONE CALL SYSTEM (1-800-242-1776), GARDEN STATE UNDERGROUNG PLANT LOCATION SERVICE (1-800-242-1000). THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE PART OF EITHER UTILITY LOCATING SERVICE LISTED ABOVE.

NO.	DATE	REVISION	APPR.
3			
2			
1	12-22-95	INCORPORATED AS-BUILT	DBM

STV/Sanders & Thomas an STV Group Company
engineers/architects/planners/scientists/construction managers
Pottstown, PA Jackson, NJ Huntingdon Valley, PA

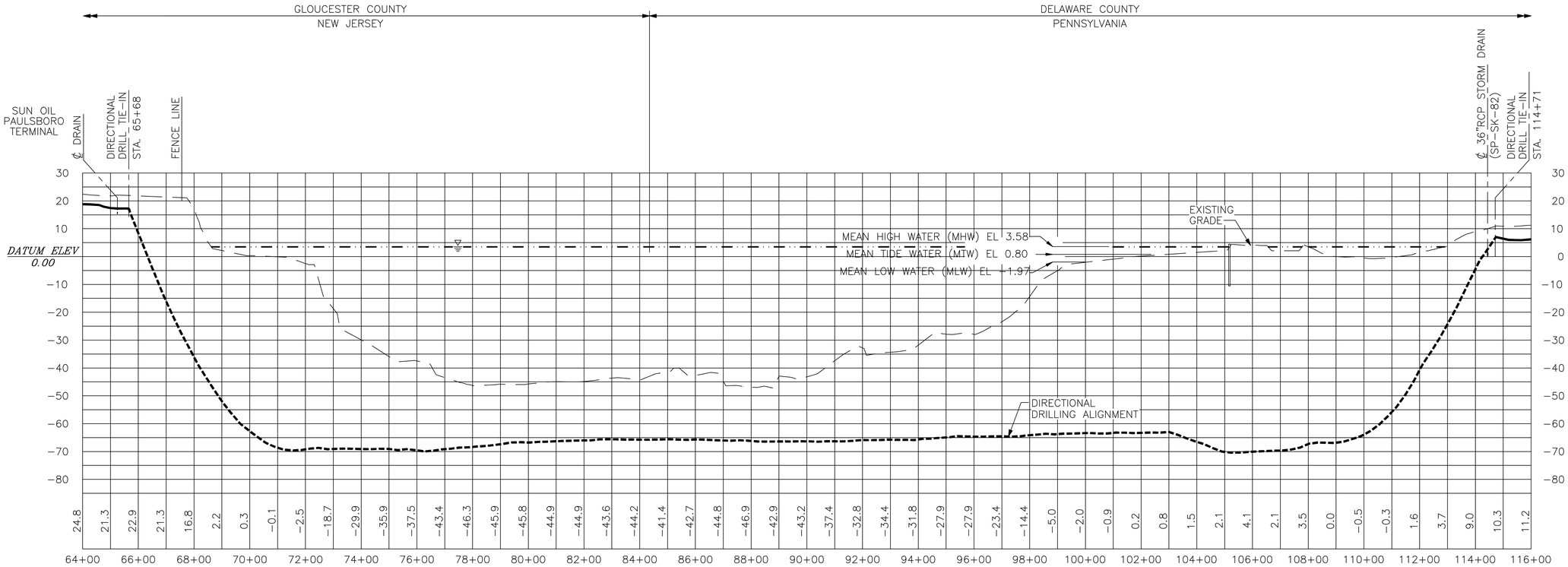
THE LOCATION OF THE PIPELINE FACILITIES AS SHOWN HEREON MUST BE CONSIDERED AS APPROXIMATE ONLY. BEFORE DIGGING OR FOR AN EXACT LOCATION PLEASE CONTACT YOUR STATES UNDERGROUND UTILITY LOCATION SERVICE.

APP 432103
APPROVED
Brad Lange
MANAGER OF ENGINEERING

SUN PIPE LINE COMPANY
EASTERN AREA

DVRC INTER-REFINERY PIPELINE PROJECT
DELAWARE RIVER DIRECTIONAL DRILL
PLAN

SCALE	AS NOTED	DATE	3-11-94
DRAWN	SFB	DRAWING NO.	SP3-500
CHECKED	MWS	REV.	1
APPROVED	GD/DBM		



PROFILE

SCALE: HORIZ 1"=200'
VERT 1"=20'

NOTES:

1. FOR LEGEND SEE COVER SHEET.
2. INSTALLED PIPELINES SHOWN ON PROFILE ARE TOP OF PIPE ELEVATIONS.
3. AS-BUILT INFORMATION FROM FLUOR DANIELS SURVEY DOCUMENTS SUBMITTED 12-5-94: AS-PR-003 THRU AS-PR-004 AND SP-SK-82.

   STATIONING IN SURVEY FIELD BOOKS DOES NOT CORESPOND WITH AS-BUILT DRAWINGS. USE STATIONING FOR DISTANCE COMPUTATION ONLY.
4. PIPELINE STATIONING IS THE ℄ OF PIPES. SEE DWG. SP3-117.

REFERENCE DRAWINGS

SP3-117	TRENCH CROSS-SECTIONS & DETAILS
SP3-508	DELAWARE RIVER DIRECTIONAL DRILL PLAN
SHEET 1 OF 1	DELAWARE RIVER CONFORMED TO CONSTRUCTION (1)6.625"x.280" (3)8.625"x.322" MICHELS PIPELINE CONSTRUCTION INC. DATED 10-18-94 AND TANGENTIAL CALCULATIONS

UTILITY NOTE:

EXTREME CARE SHALL BE EXERCISED WHEN OPERATING NEAR EXISTING UTILITIES. THE CONTRACTOR SHALL EXPOSE EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL CONTACT THE PA ONE CALL SYSTEM (IN PENNSYLVANIA) OR THE GARDEN STATE UNDERGROUND PLANT LOCATION SERVICE (IN NEW JERSEY) A MINIMUM OF (3) THREE DAYS PRIOR TO ANY EXCAVATION WORK ASSOCIATED WITH THIS PROJECT. THE TELEPHONE NUMBERS ARE, PA ONE CALL SYSTEM (1-800-242-1776), GARDEN STATE UNDERGROUNG PLANT LOCATION SERVICE (1-800-242-1000). THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE PART OF EITHER UTILITY LOCATING SERVICE LISTED ABOVE.

GRAPHIC SCALE 1"=200' 200' 0 200' 400'

GRAPHIC SCALE 1"=20' 20' 0 20' 40'

STV / SANDERS & THOMAS
ENGINEERS ARCHITECTS PLANNERS
Executive Offices/Pottstown,PA
Pottstown,PA ● Jackson,NJ ● Mclean,VA
Huntington Valley,PA ● Oak Ridge,TN

LOCATION OF PIPE LINE FACILITIES AS SHOWN HEREON MUST BE CONSIDERED AS APPROXIMATE ONLY. BEFORE DIGGING IN VICINITY OR FOR EXACT LOCATION CONTACT NEAREST FIELD OFFICE.

AFE 432103
APPROVED
Brad Lange
MANAGER OF ENGINEERING

NO.	DATE	REVISION	APPR.
3			
2			
1	12-22-95	INCORPORATED AS-BUILT	MWS/MWS DBM

SUN PIPE LINE COMPANY
EASTERN AREA

DVRC INTER-REFINERY PIPELINE PROJECT
DELAWARE RIVER DIRECTIONAL DRILL
PROFILE

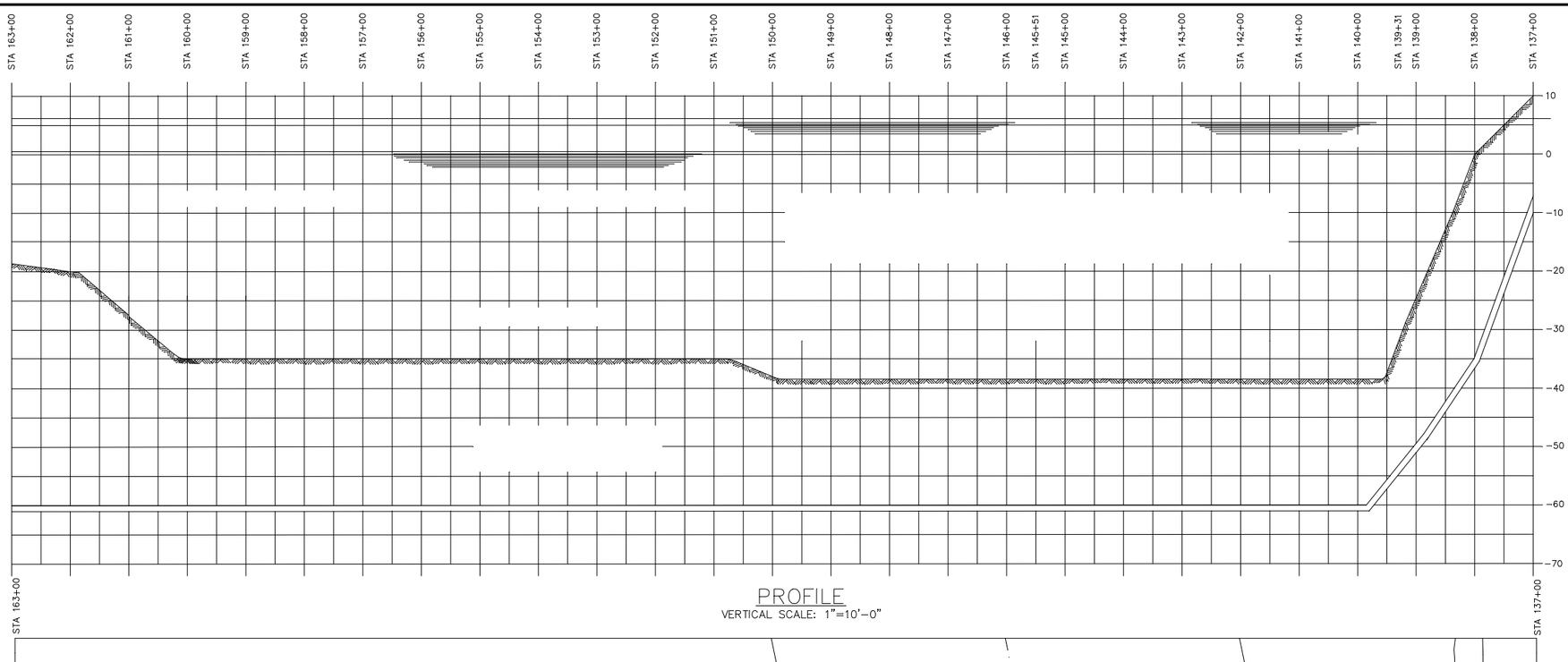
SCALE	1"=200'	DATE	3-11-94
DRAWN	SFB	DRAWING NO.	SP3-501
CHECKED	MWS	REV.	1
APPROVED	GD\DBM		

SP3-501.DWG

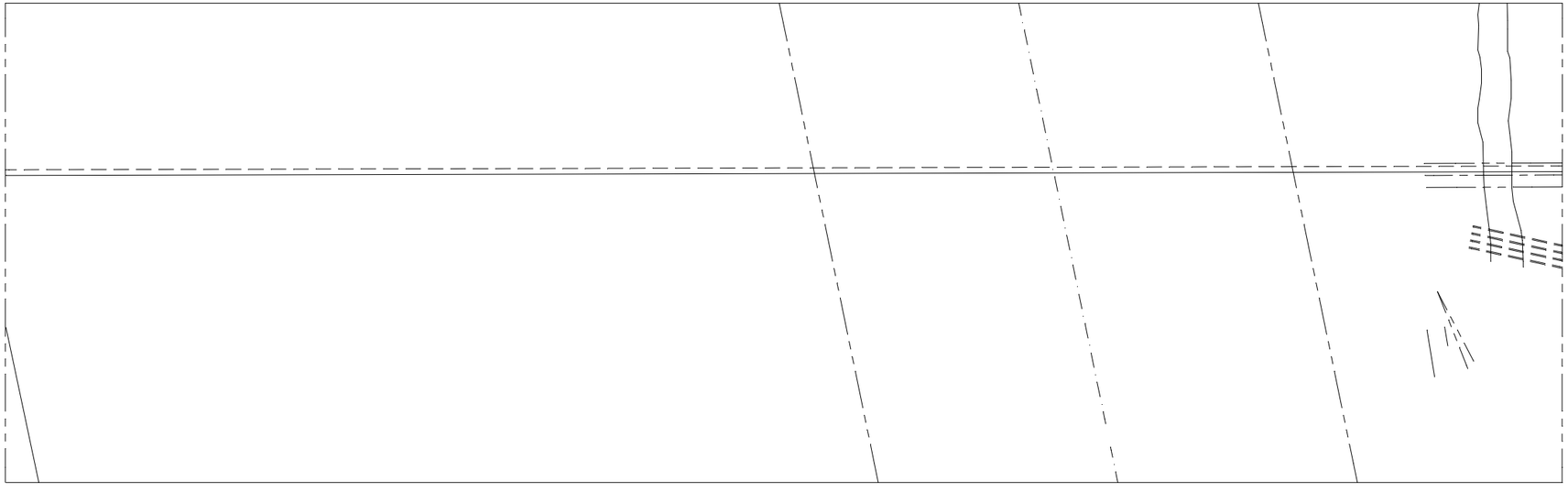
K:\PROJECTS\6660PA\AS-BUILT\SP3-501 NDQ CDA 96-01-11 16:37

SUNOCO LOGISTICS, LP (W)

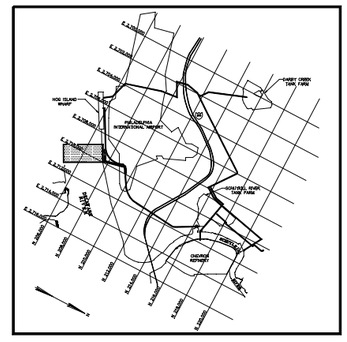
Utility W – 12” Pipeline
Plan & Profile Design Drawings



PROFILE
VERTICAL SCALE: 1"=10'-0"



PLAN
SCALE: 1"=100'-0"



KEY PLAN
SCALE: 1"=5000'-0"

GRAPHIC SCALE
0 125' 250'
SCALE: 1"=250'-0"

DATUM	EL.
GULF OIL (PHILA. REFINERY ONLY)	13.000'
U.S. GOV'T. U.S.E. DELAWARE RIVER	12.625'
U.S.E. SCHUYLKILL RIVER	11.625'
U.S.C. & G.S. (M.S.L.) SANDY HOOK	9.724'
PHILA. INT. AIRPORT	4.147'
PHILA. CITY (2nd DIST.)	3.766'

CONVERSION FACTOR: 0.375', 3.276', 8.853', 9.234'

NOTE:
WHEN CONVERTING TO A GULF ELEVATION, THE CONVERSION FACTOR (SHOWN ABOVE RIGHT) MUST BE ADDED TO THE ELEVATION OF THE DATUM BEING USED.
EXAMPLE:
GOV'T. DATUM + CONV. FAC. = GULF DATUM
EL. 14.750' + 0.375' = 15.125'
THIS SK. SUPERSEDES GULF SK. G-2717

COMPARISON OF VARIOUS ELEVATION DATUM

Miller-Remick Corporation
400 WHITE HORSE PIKE (RT.30)
HADDON HEIGHTS, N.J. 08035
(609)546-4600
JOB. No. 111591

REV.	DATE	DESCRIPTION	BY	CK.

ORIGINAL PIPELINE DESIGN SPECIFICATIONS

MAXIMUM OPERATING PRESSURE _____
PIPE DIA.(S) _____
PIPE NOM. WALL THICKNESS _____
MATERIAL GRADE _____ TYPE _____
REF. DATA _____

GENERAL NOTES

1.) BACKGROUNDS ARE BASED ON UNITED STATES GEOLOGICAL SURVEYS.
2.) THESE DRAWINGS ARE NOT THE ORIGINALS - (SEE REFERENCE DRAWINGS FOR ORIGINALS).

REFERENCES

1.) SINCLAIR PIPELINE DWG. No. 5.105.120-11 , GULF 12" PIPELINE , GIRARD POINT REFINERY TO WOODBURY STATION. DISTRICT No. 6901 , MAP No. 11
2.) SINCLAIR PIPELINE DWG. No. PL-RW-33 , 12" GULF PIPELINE CROSSING DELAWARE RIVER FROM DELAWARE COUNTY , PA. TO GLOUCESTER COUNTY , NEW JERSEY.
3.) SOHIO PIPELINE DWG. No. 412C22C , GULF 12" PIPELINE , GIRARD POINT REFINERY TO WOODBURY STATION DISTRICT No. 6900 , MAP No. 10.

N

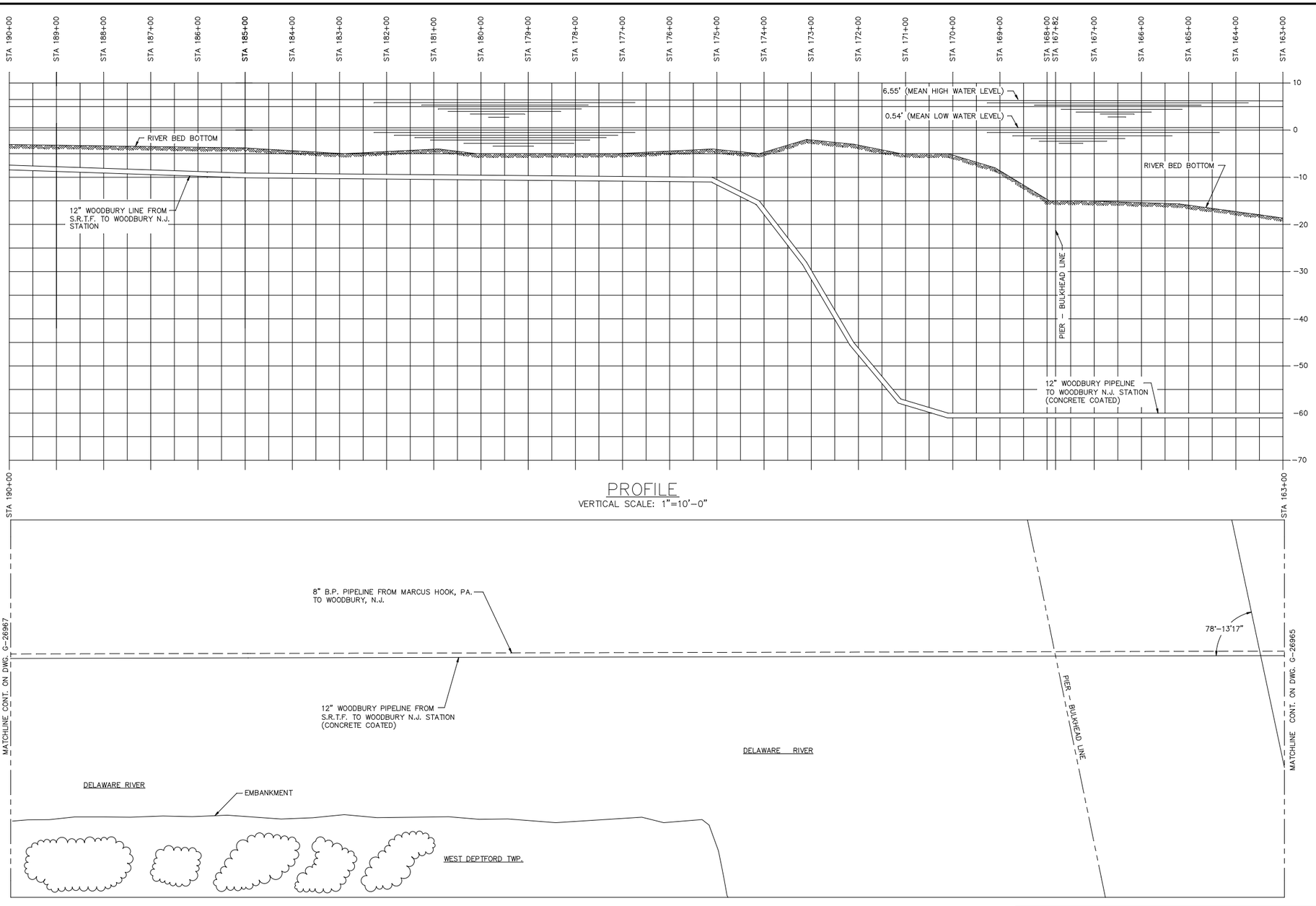
Chevron U.S.A. Products Company
Philadelphia Refinery

SCALE AS NOTED DATE 12/16/91 APPROVED
DR. D.C.G. CH. R.J.H. DR. APP. ENGR.
OPR'G DEPT. ENG. DEPT.

REFINERY OFF-SITE PIPELINE DOCUMENTATION
12" PIPELINE - CHEVRON S.R.T.F. TO WOODBURY STATION
PLAN & PROFILE STA 137+00 TO 163+00

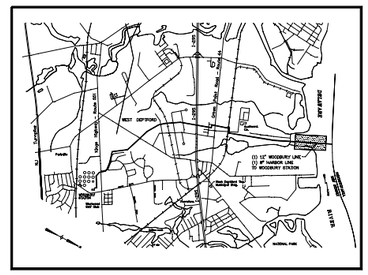
W.O. _____
S.O. _____
G-26965

CH03085



PROFILE
VERTICAL SCALE: 1"=10'-0"

PLAN
SCALE: 1"=100'-0"



KEY PLAN
SCALE: 1"=5000'-0"

GRAPHIC SCALE
0 125' 250'
SCALE: 1"=250'-0"

Miller-RemickCorporation
400 WHITE HORSE PIKE (RT.30)
HADDON HEIGHTS, N.J. 08035
(609)546-4600
JOB. No. 111591

REV.	DATE	DESCRIPTION	BY	CK.

ORIGINAL PIPELINE DESIGN SPECIFICATIONS

MAXIMUM OPERATING PRESSURE 300 P.S.I.
PIPE DIA.(S) 12"
PIPE NOM. WALL THICKNESS 0.500"
MATERIAL GRADE GRADE B CL-I TYPE SEAMLESS
REF. DATA NATIONAL TUBE D.L. WITH HEVICOTE (CONCRETE COATING)

GENERAL NOTES

1.) BACKGROUNDS ARE BASED ON UNITED STATES GEOLOGICAL SURVEYS.
2.) THESE DRAWINGS ARE NOT THE ORIGINALS (SEE REFERENCE DRAWINGS FOR ORIGINALS)

REFERENCES

1.) SINCLAIR PIPELINE DWG. No. 5.105.120-11 12" GULF PIPELINE, GIRARD POINT REFINERY TO WOODBURY STATION DIST. No. 6901 MAP No. 11
2.) SINCLAIR PIPELINE DWG. No. PL-RW-33 12" GULF PIPELINE CROSSING DELAWARE RIVER FROM DELAWARE COUNTY, PA. TO GLOUCESTER COUNTY, NEW JERSEY.

N

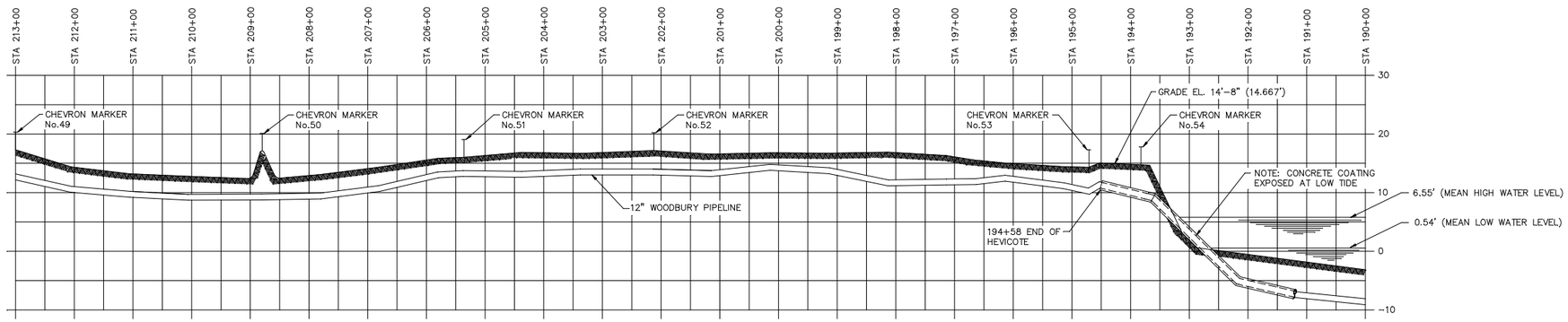
Chevron U.S.A. Products Company
Philadelphia Refinery

SCALE AS NOTED DATE 12/16/91 APPROVED
DR. D.C.G. CH. R.J.H. DR. APP. ENGR.
OPR'G DEPT. ENG. DEPT.

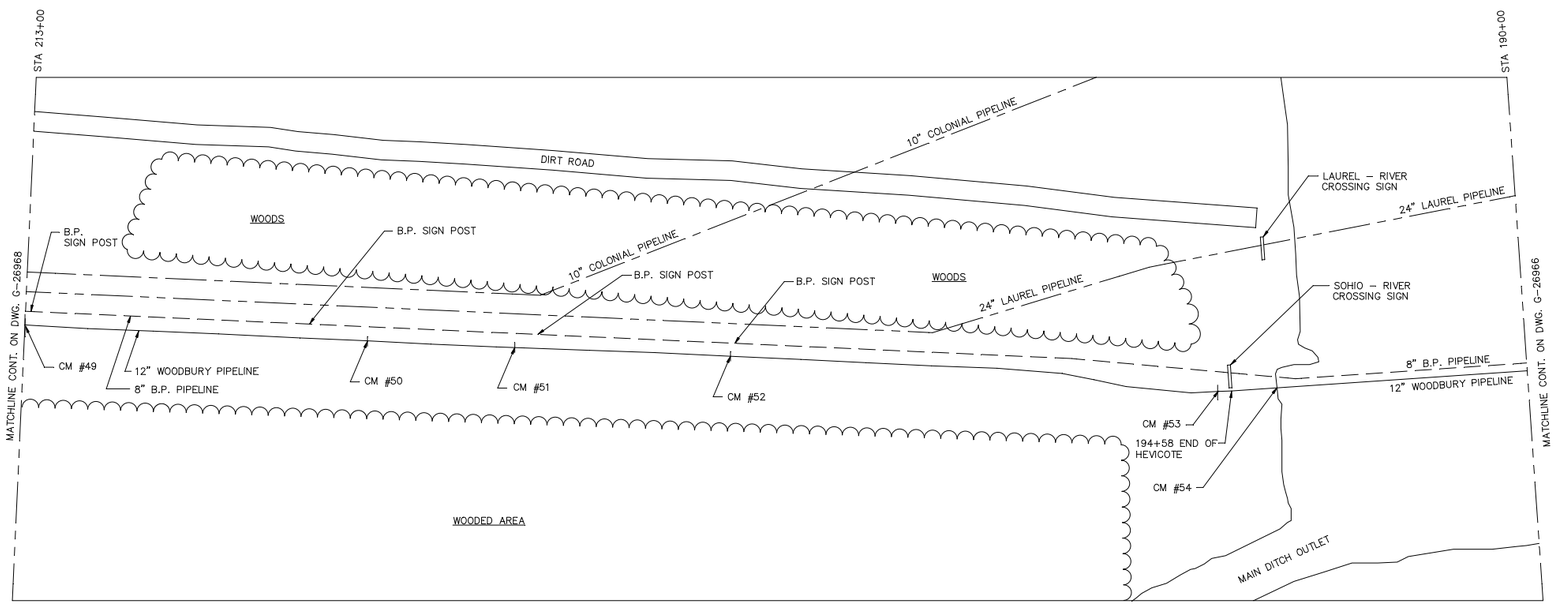
REFINERY OFF-SITE PIPELINE DOCUMENTATION
12" PIPELINE – CHEVRON S.R.T.F. TO WOODBURY STATION
PLAN & PROFILE STA 163+00 TO 190+00

W.O.
S.O.
G-26966

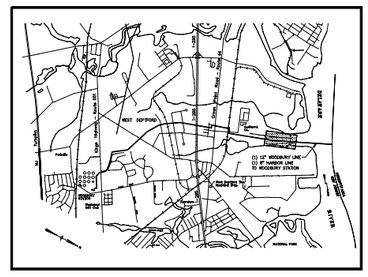
CH03086



PROFILE
VERTICAL SCALE: 1"=10'-0"



PLAN
SCALE: 1"=100'-0"



KEY PLAN
SCALE: 1"=5000'-0"

GRAPHIC SCALE
0 125' 250'
SCALE: 1"=250'-0"

Miller-RemickCorporation
400 WHITE HORSE PIKE (R.T.30)
HADDON HEIGHTS, N.J. 08035
(609)546-4600
JOB. No. 111591

REV.	DATE	DESCRIPTION	BY	CK.

ORIGINAL PIPELINE DESIGN SPECIFICATIONS

MAXIMUM OPERATING PRESSURE 676 PSI*
PIPE DIA.(S) 12"
PIPE NOM. WALL THICKNESS 0.312" AND 0.500" (UNDER RIVER)
MATERIAL GRADE B, CLASS-I TYPE SEAMLESS
REF. DATA UNDERGROUND PIPING IS SOMASTIC COATED.
UNDER RIVER PIPING IS NATIONAL TUBE D.L. WITH HEVICOTE
* PRESSURE DETERMINED BY CHEVRON HYDROTEST AS PER DOT REGULATIONS.

GENERAL NOTES

1.) BACKGROUNDS ARE BASED ON UNITED STATES GEOLOGICAL SURVEYS.
2.) SEE REF No. 1 FOR ORIGINAL DWG OF THIS AREA.
3.) PLAN AND GRADE ELEVATIONS ARE BASED ON SURVEY DATA SUPPLIED BY TOTAL ASSOCIATES, KENNETT SQUARE, PA. 2/26/92
4.) PIPELINE ELEVATION REFERENCE TAKEN FROM DWG. REFEFENCE No. 2
5.) PIPELINE DEPTHS SURVEYED ELECTRONICALLY USING A METROTECH SENSOR.

REFERENCES

1.) SINCLAIR PIPELINE DWG. No. 5.105.120-11 12" GULF PIPELINE, GIRARD POINT REFINERY TO WOODBURY STATION DISTRICT No. 6901 MAP No. 11.
2.) SINCLAIR PIPELINE DWG. No. PL-RW-33 12" GULF PIPELINE CROSSING DELAWARE RIVER FROM DELAWARE COUNTY, PA. TO GLOUCESTER COUNTY, N.J.
3.) COLONIAL PIPELINE DWG. No. 5.331.604 (PL-RW-37) WOODBURY - GIRARD STATION 120+00 TO STATION 204+63 GLOUCESTER COUNTY, NEW JERSEY DELAWARE COUNTY, PENNSYLVANIA
4.) CHEVRON DWG. No. G-26926 - PROPERTIES AND PIPELINE RIGHT OF WAY MAP WEST DEPTFORD TOWNSHIP, GLOUCESTER COUNTY, NEW JERSEY.

N

Chevron U.S.A. Products Company
Philadelphia Refinery

SCALE AS NOTED DATE 3/26/92 APPROVED
DR. GS CH. R.J.H. DR. APP. ENGR.
OPR'G DEPT. ENG. DEPT.

REFINERY OFF-SITE PIPELINE DOCUMENTATION
12" PIPELINE - CHEVRON S.R.T.F. TO WOODBURY STATION
PLAN AND PROFILE STA 190+00 TO 213+00

W.O.
S.O.
G-26967

CH03048

COLONIAL PIPELINE

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

December 19, 2011

Attention: Mr. Paul Senger, Colonial Pipeline Company
Via E-Mail: psenger@colpipe.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Senger:

As you are aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next sections of the channel to be dredged are areas known as Reaches A-A and A, which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of a portion of these areas will begin sometime in the calendar year 2012.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations. To that end, GBA has obtained the information from the Corps relating to two 10" pipelines owned by Colonial (referred to as the Girard Active and Girard Nitrogen capped lines or lines 39 and 39S, respectively) crossing the Delaware River in the vicinity of the Philadelphia Airport. copies of e-mail correspondence from Colonial Pipeline Company containing Lat/Long data for the crossing of two 10" product pipelines 4)

Attached are 1) a diagram of the general location of Reaches A-A & A, 2) a drawing for a proposed 10" product pipeline crossing at Station 65+913 dated June 8, 1963, 3) the previous drawing indicating a 2nd 10" pipeline being added dated November 23, 1964, 4) an as-built survey prepared by Colonial and dated September 2, 1965, and 5) two figures showing plan and profile views of the pipeline crossing(s). Figure 1 shows the approximate location of the submarine utility crossing(s) based upon Lat/Long information (lines 39 & 39S, PA side only) provided to the Corps by Colonial and a 2008 hydro survey by Phoenix Solutions (line 39, NJ side only). The Lat/Long information has been converted to New Jersey State Plane coordinates. Figure 2 shows a profile of the crossing in the navigation channel, and is based upon the as-built survey (item 4 above). It is not known whether the as-built profile applies to both lines, or just the active one. Please advise.

GBA is requesting that you examine the attached plan and profile views of the above referenced utility crossings, make appropriate corrections and provide any additional available information to more accurately describe their location. We would also like you to identify any additional crossings, active or inactive, your company may own/operate within Reaches A-A and A that are not shown on the attached drawings.

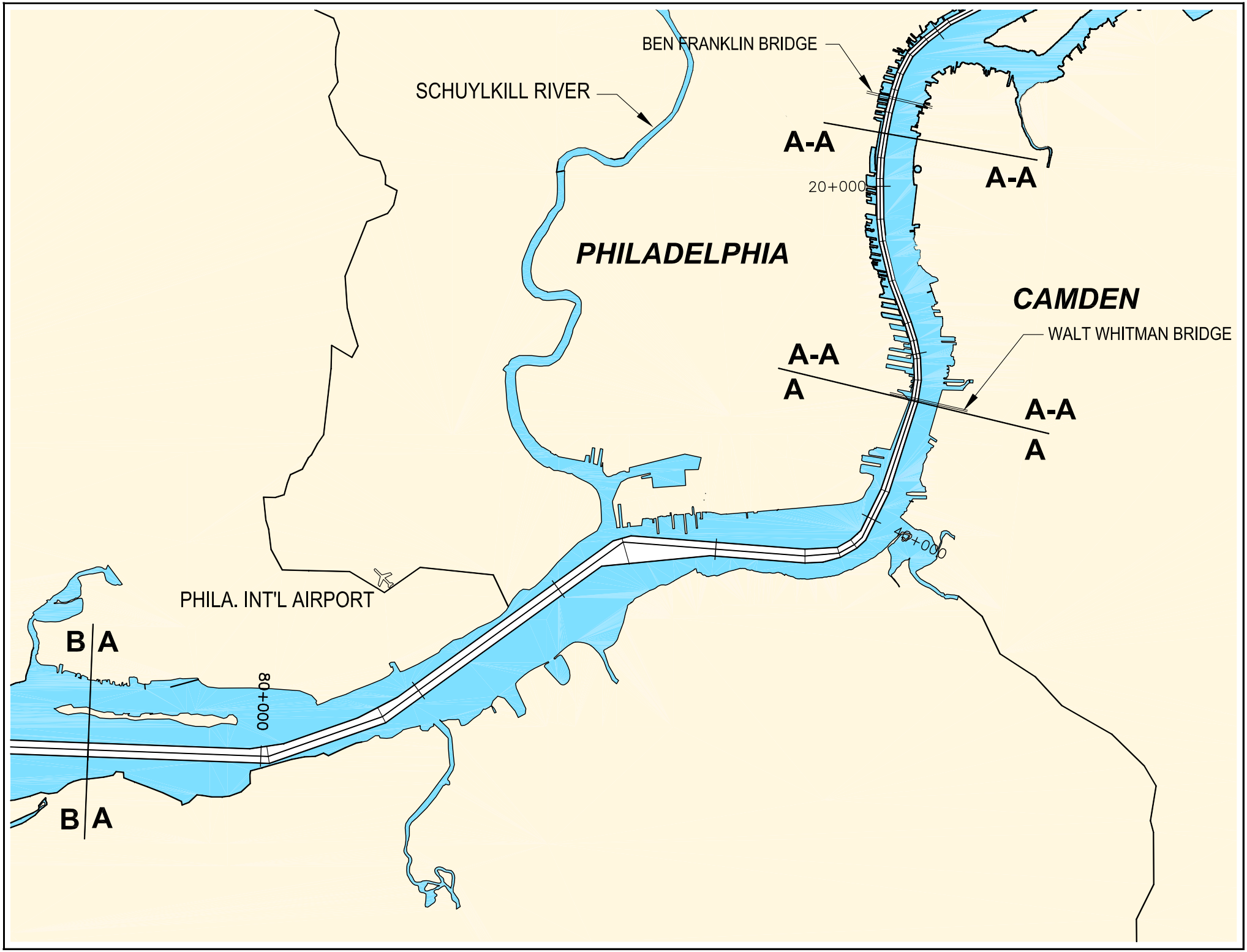
If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at (215) 656-6680.

If you have any questions or would like to schedule a meeting to review the attached information, please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com.

We appreciate your assistance in this verification process.

Sincerely,

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

COLONIAL PIPELINE [U(1)]

Utility U – 10” Gas Pipeline (Inactive)
Corps Permit and Drawings

...or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity ... consent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS ... CERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago*, 188 U. S., 410.) 16-[illegible]

NAPCP-N

PERMIT

U. S. Army Engineer District, Philadelphia
Corps of Engineers
Custom House, Philadelphia, Pennsylvania 19106
6 April, 1964

Colonial Pipeline Company
3390 Peachtree Road N.E.
Lenox Towers
Atlanta 26, Georgia

Gentlemen:

Referring to written request dated 14 June 1963 by Mr. Ben D. Leuty, - - - -

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army.

to lay a submarine pipe line, the pipe line trench to be backfilled with suitable
(Here describe the proposed structure or work.)
heavy material, all dredging and disposal operations to be performed to the satisfaction of the District Engineer, -

in and across the Delaware River -
(Here to be named the river, harbor, or waterway concerned.)

at a point between Hog Island, Tinicum Township, Delaware County, Pennsylvania and near
(Here to be named the nearest well known locality, preferably a town or city, and the distance in miles and to which from some definite point in the name, stating whether above or below or giving direction by points of compass.)
Repaupo Township, Gloucester County, New Jersey, - - - - - - - - - - - - - - - -

in accordance with the plans shown on the drawing attached hereto and marked:
(Or drawings, give file number or other definite identification marks.)

"2 sheets" (Delaware River - Colonial Pipeline Co. - No. 2) E-1 and E-2" - - - - - - -

subject to the following conditions:

...on so require.

(*b*) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(*c*) That there shall be no unreasonable interference with navigation by the work herein authorized.

(*d*) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(*e*) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(*f*) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(*g*) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(*h*) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(*i*) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(*j*) That if the structure or work herein authorized is not completed on or before ..... 31st ..... day of ..... December ....., 19 67, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

By authority of the Secretary of the Army:

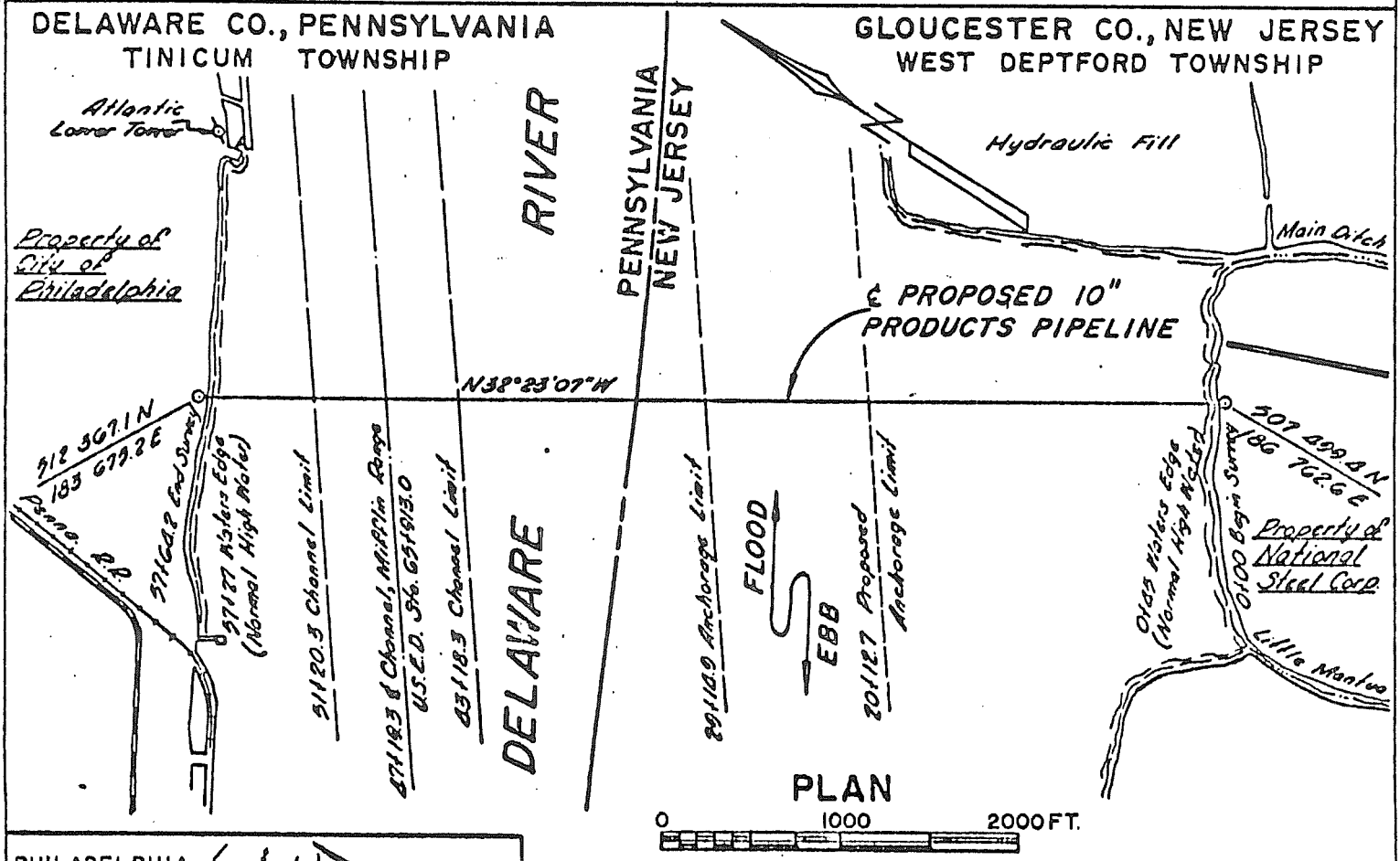
E. P. YATES
Colonel, Corps of Engineers
District Engineer

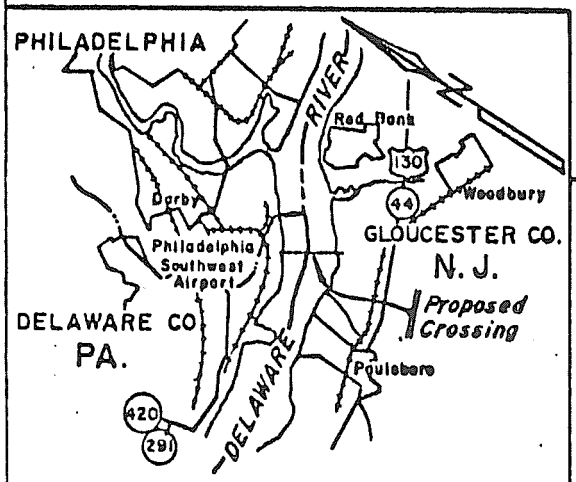
ENG FORM 1 SEP 58 1721 (Civil) This form supersedes ED Form 06, dated 1 Apr 48, which may be used until exhausted.

U. S. GOVERNMENT PRINTING OFFICE 16—13108-5

1251 1145-2-508

(Delaware River - Colonial Pipeline Co. - No. 2) E-1





Note:
Coordinates Refer to U.S.C.E. Grid System
Ref. Dwg. - U.S.C.E. Delaware River Survey Dwg. 28049 sht. 9 of 12

This pipeline to be used to transport petroleum products from Woodbury, New Jersey to Philadelphia, Pennsylvania.

Application by: COLONIAL PIPELINE COMPANY

Date 6-14-63 Engineer John L Diamond

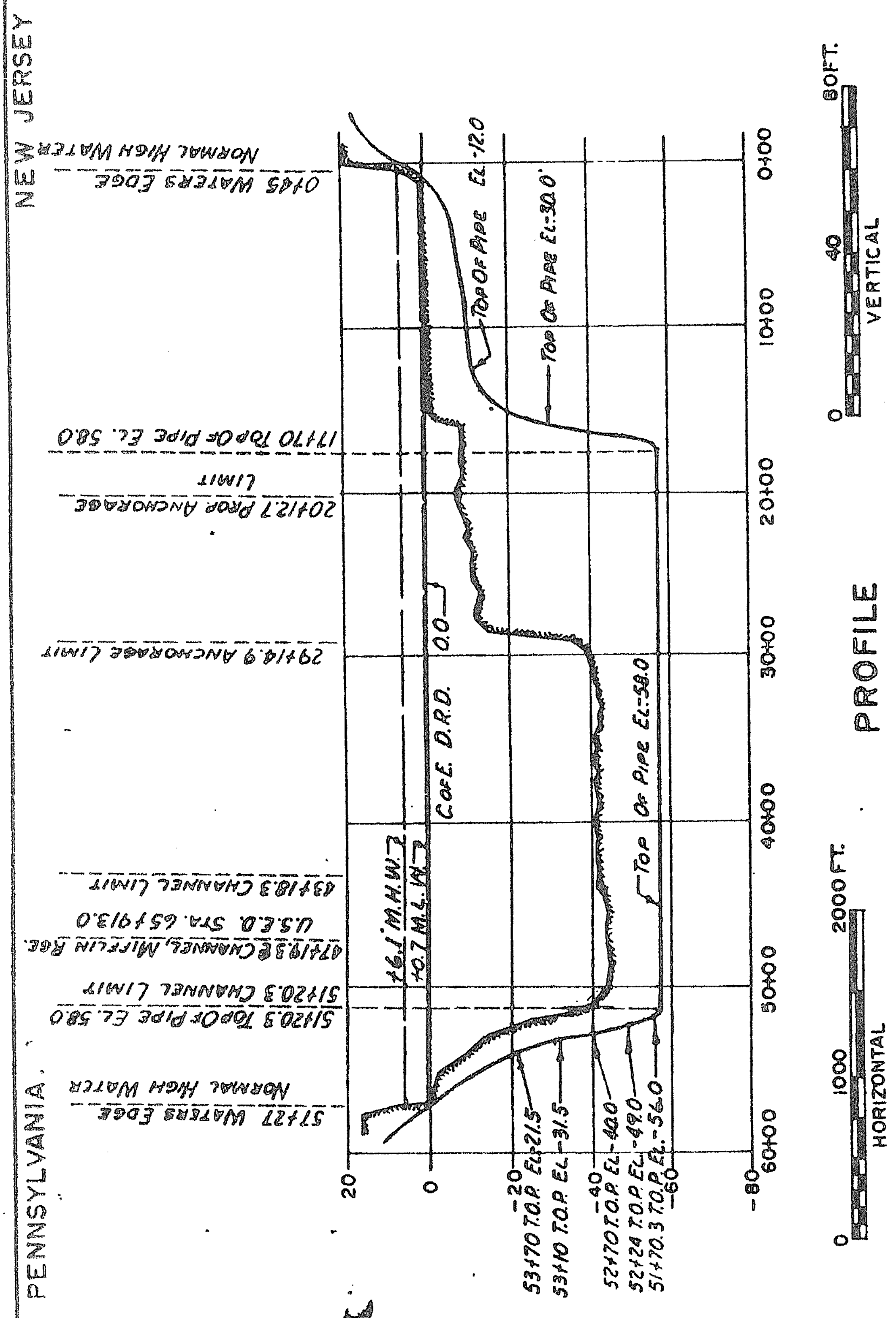
Sheet 1 of 2

COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA

PROPOSED 10" PRODUCTS PIPELINE CROSSING UNDER DELAWARE RIVER AT U.S.E.D. CHANNEL STATION 66+913

DRAWN JDW
NOTES
SCALE Shown
DATE 6-8-63
CHECKED PMT

2. 770 (Delaware River - Colonial Pipeline Co. - No. 2) E-2



NOTE: PIPE TRENCH TO BE BACKFILLED WITH SUITABLE HEAVY MATERIAL TO A POINT 10.0 FT. ABOVE TOP OF PIPE FROM STA. 10+00 TO 18+00 AND FROM STA. 53+00 TO 55+00; AND 12.0 FT. ABOVE TOP OF PIPE FROM STA. 18+00 TO 53+00. INCLUDING 5-10% CLAY FROM BANK TO BANK.

B.M. U.S.C.E. 'AZIMUTH' AT FT. MIFFLIN, PA. ELEV. 9.623 FT. M.S.L.

NOTE: U.S.E.D. DATUM 2.901 FT. BELOW U.S.C. & G.S. DATUM. ELEVATIONS ARE IN FEET AND ARE ADJUSTED TO U.S.E.D. DATUM DELAWARE RIVER

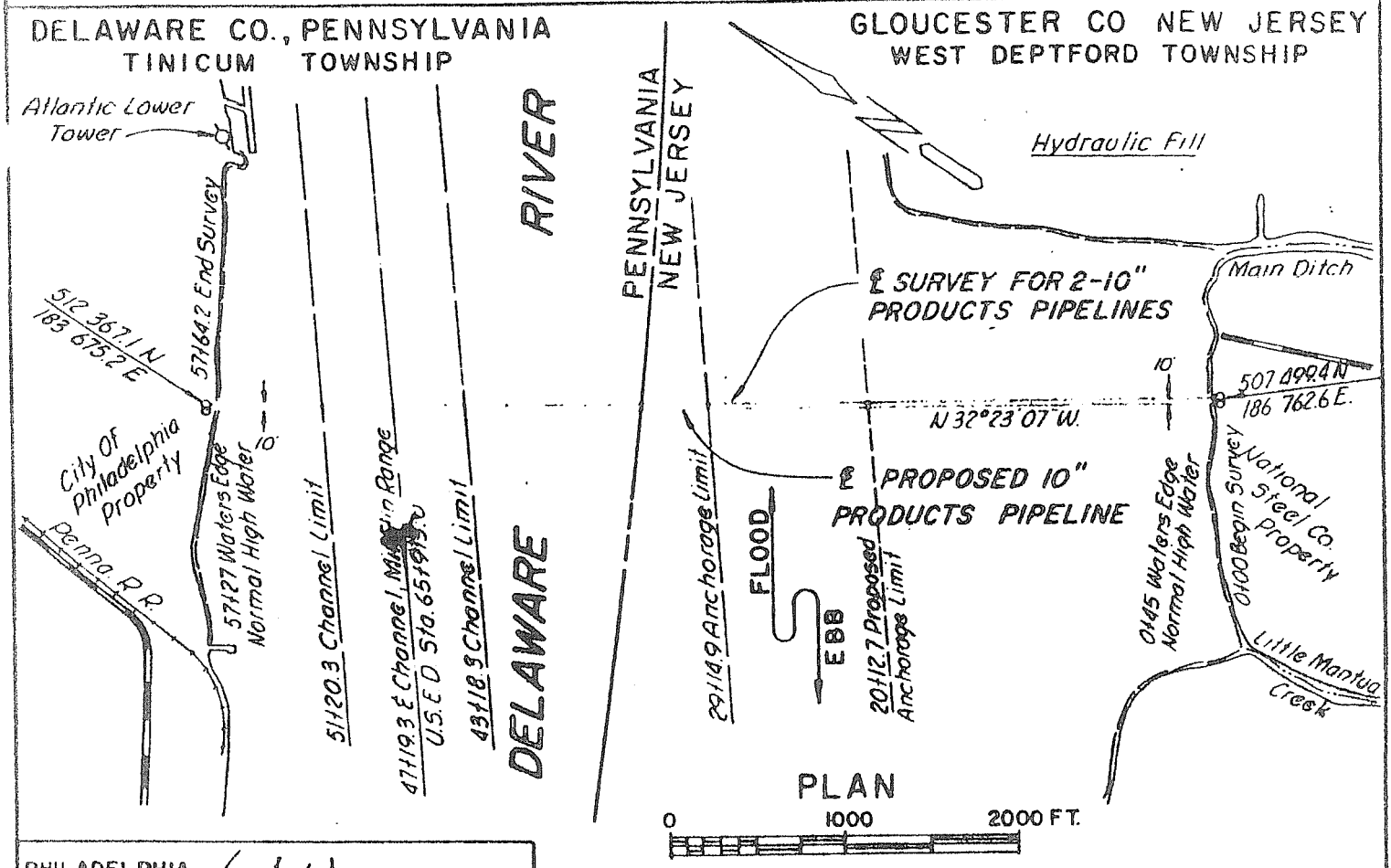
PREPARED FROM AMERICA DREDGING CO. PROFILE

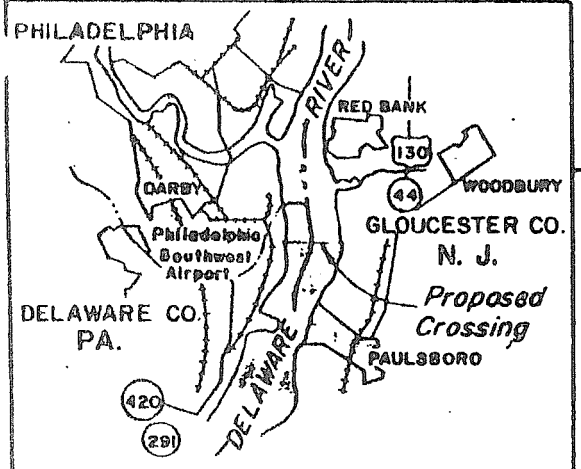
SHEET 2 OF 2

5	AMENDMENT	8-8-63	**COLONIAL PIPELINE COMPANY**	DRAWN B.R.R.
4	STATIONS & ELEV. ADDED	8-1-63	ATLANTA, GEORGIA	NOTES
3	REDRAWN - REVISED PIPE ELEV.	8-1-63	PROPOSED 10" PRODUCTS PIPELINE	SCALE AS SHOWN
2	REVISED ELEV. TO -56.0	7-18-63	CROSSIN[G] UNDER DELAWARE RIVER	DATE 6-8-63

COLONIAL PIPELINE [U2(1)]

Utility U2 – 10” Gas Pipeline
Corps Permit Application Drawings





NOTE:
Coordinates Refer To U.S.C.E. Grid System.
Ref. Dwg. U.S.C.E. Delaware River Survey Dwg. 28049 Sh. 9 of 12

THESE PIPELINES TO BE USED TO TRANSPORT PETROLEUM PRODUCTS FROM WOODBURY, NEW JERSEY TO PHILADELPHIA, PENNSYLVANIA

APPLICATION BY: COLONIAL PIPELINE COMPANY

DATE: 11-23-64 ENGINEER John Z. Diamond

Sheet 1 of 2

REVISION	DATE
.6 Added 2nd Pipeline	11-23-64

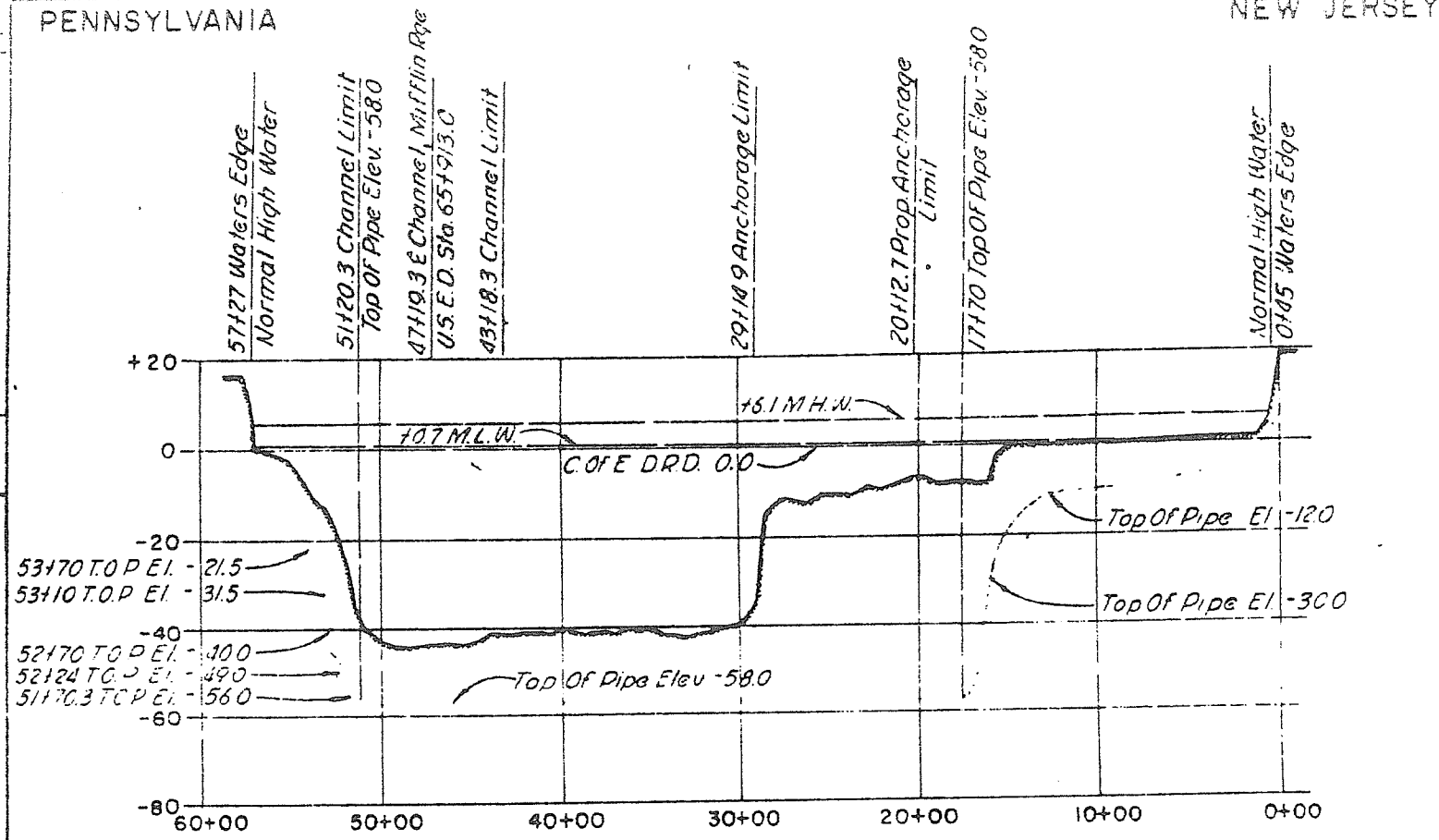
COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA

2 PROPOSED 10" PRODUCTS PIPELINES
CROSSING UNDER DELAWARE RIVER
AT U.S.E.D CHANNEL STATION 65+913
DELAWARE CO., PA. & GLOUCESTER CO., N.J.

DRAWN B.R.R
NOTES
SCALE Shown
DATE 6-8-63
CHECKED FT
1311-PX-1

PENNSYLVANIA

NEW JERSEY



0 1000 2000 FT.
HORIZONTAL

PROFILE

0 40 80 FT.
VERTICAL

B.M.
U.S.C.E. "Azimuth" At Fort Mifflin, Pa.
Elevation = 9.623 M.S.L.

NOTE:
U.S.E.D. Datum 2.90 Ft. Below U.S.C.&G.S. Datum. Elevations Are In Feet And Are Adjusted To U.S.E.D. Datum Delaware River

NOTE:
Pipe Trench To Be Backfilled With Suitable Heavy Material To A Point 10.0 Ft. Above Top Of Pipe From Sta. 10+00 To 18+00 And From Sta. 53+00 To 55+00 And 12.0 Ft. Above Top Of Pipe From Sta. 18+00 To 53+00. Including 5-10% Clay From Bank To Bank.

Prepared From American Dredging Co. Profile

COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA

2 PROPOSED 10" PRODUCTS PIPELINES
CROSSING UNDER DELAWARE RIVER
AT U.S.E.D. CHANNEL STATION 65+91.3

DRAWN B.R.R.
NOTES
SCALE Shown
DATE 6-28-63
CHECKED F.T.

Sheet 2 of 2

Proposed 24" Pipeline

COLONIAL PIPELINE [U2(2)]

Utility U2 – 10” Gas Pipeline
As-Built Drawing

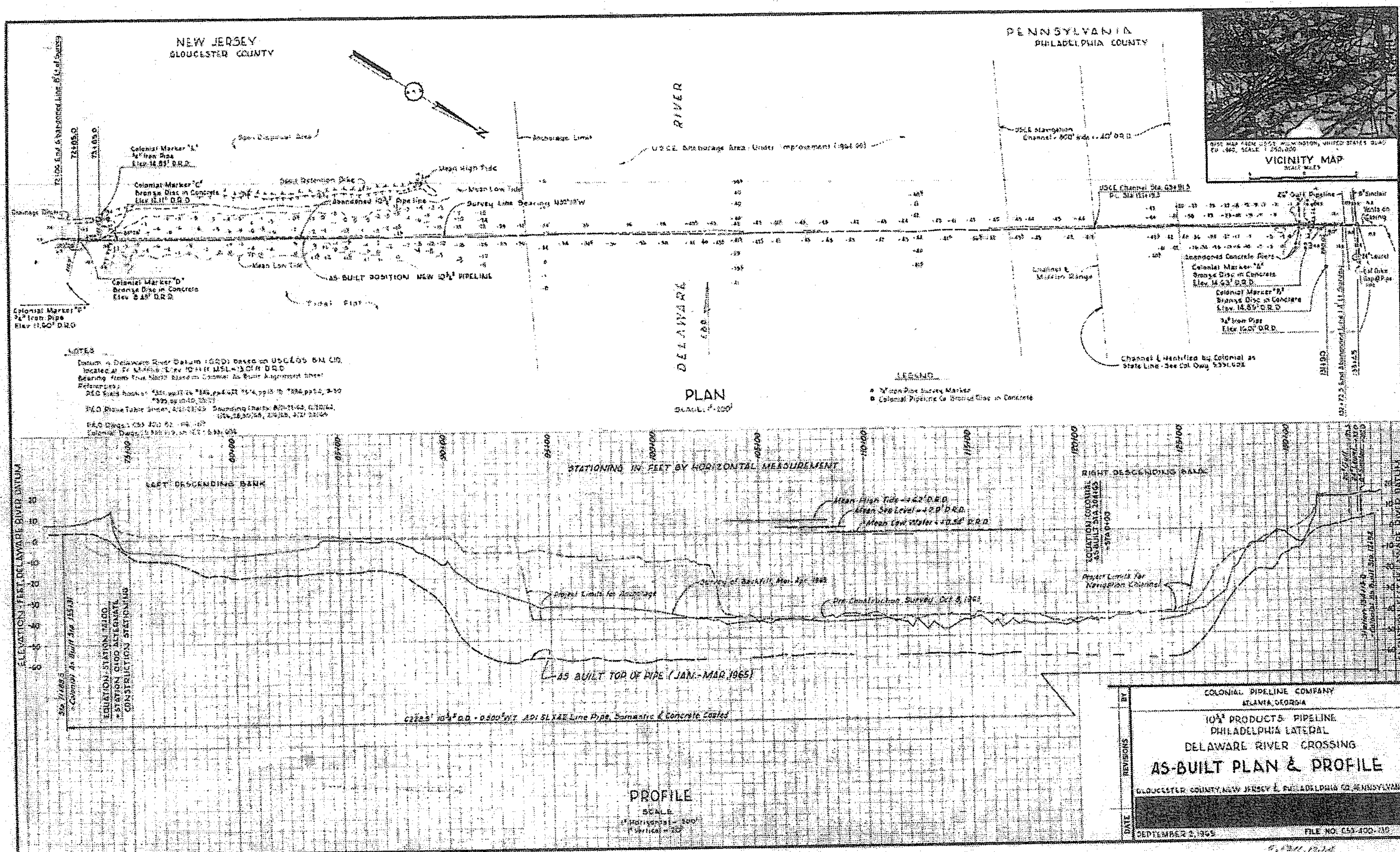

NEW JERSEY
GLOUCESTER COUNTY
PENNSYLVANIA
PHILADELPHIA COUNTY
VICINITY MAP
DELAWARE
RIVER
Anchorage Limit
Spoil Disposal Area
Spoil Retention Dike
Mean High Tide
Mean Low Tide
Abandoned 10¾" Pipe line
Survey Line Bearing N30°18'W
AS-BUILT POSITION NEW 10¾" PIPELINE
Tidal Flat
Colonial Marker "A" ¾" Iron Pipe Elev 14.85' D.R.D.
Colonial Marker "C" Bronze Disc in Concrete Elev 15.11' D.R.D.
Colonial Marker "D" Bronze Disc in Concrete Elev 8.49' D.R.D.
Colonial Marker "E" ¾" Iron Pipe Elev 11.90' D.R.D.
Abandoned Concrete Piers
Colonial Marker "A" Bronze Disc in Concrete Elev 14.63' D.R.D.
Colonial Marker "B" Bronze Disc in Concrete Elev 14.85' D.R.D.
¾" Iron Pipe Elev 15.01' D.R.D.
Channel ⅊ Identified by Colonial as State Line - See Col. Dwg 5391-602
USCE Navigation Channel - 800' Wide - 40' D.R.D.
USCE Channel Sta. 65+91.5
PLAN
LEGEND
NOTES
STATIONING IN FEET BY HORIZONTAL MEASUREMENT
LEFT DESCENDING BANK
RIGHT DESCENDING BANK
Mean High Tide +6.62' D.R.D.
Mean Sea Level +3.9' D.R.D.
Mean Low Water +0.54' D.R.D.
Project Limits for Anchorage
Survey of Backfill, Mar.-Apr. 1965
Pre-Construction Survey Oct. 5, 1964
Project Limits for Navigation Channel
AS BUILT TOP OF PIPE (JAN.-MAR 1965)
ELEVATION-FEET DELAWARE RIVER DATUM
EQUATION: STATION 74+00 = STATION 0+00 ALTERNATE CONSTRUCTION STATIONING
EQUATION: COLONIAL AS-BUILT STA 204+63 = STA 0+00
PROFILE
COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA
10¾" PRODUCTS PIPELINE
PHILADELPHIA LATERAL
DELAWARE RIVER CROSSING
AS-BUILT PLAN & PROFILE
GLOUCESTER COUNTY, NEW JERSEY & PHILADELPHIA CO., PENNSYLVANIA
SEPTEMBER 2, 1965
FILE NO. C53-400-110
DATE
REVISIONS
BY

Fig 49

COLONIAL PIPELINE [U(3)]

Utility U2 – 10” Gas Pipeline
GBA Plan & Profile Drawings

(39S) N 377,396
E 288,825

(39) N 377,398
E 288,816

63+000

64+000

65+000

66+000

67+000

68+000

69+000

70+000

71+000

SERVICE

TANKS

RIVER

N 372,539 (39)
E 291,845

N 507000

GBA
ENGINEERS ★ SURVEYORS

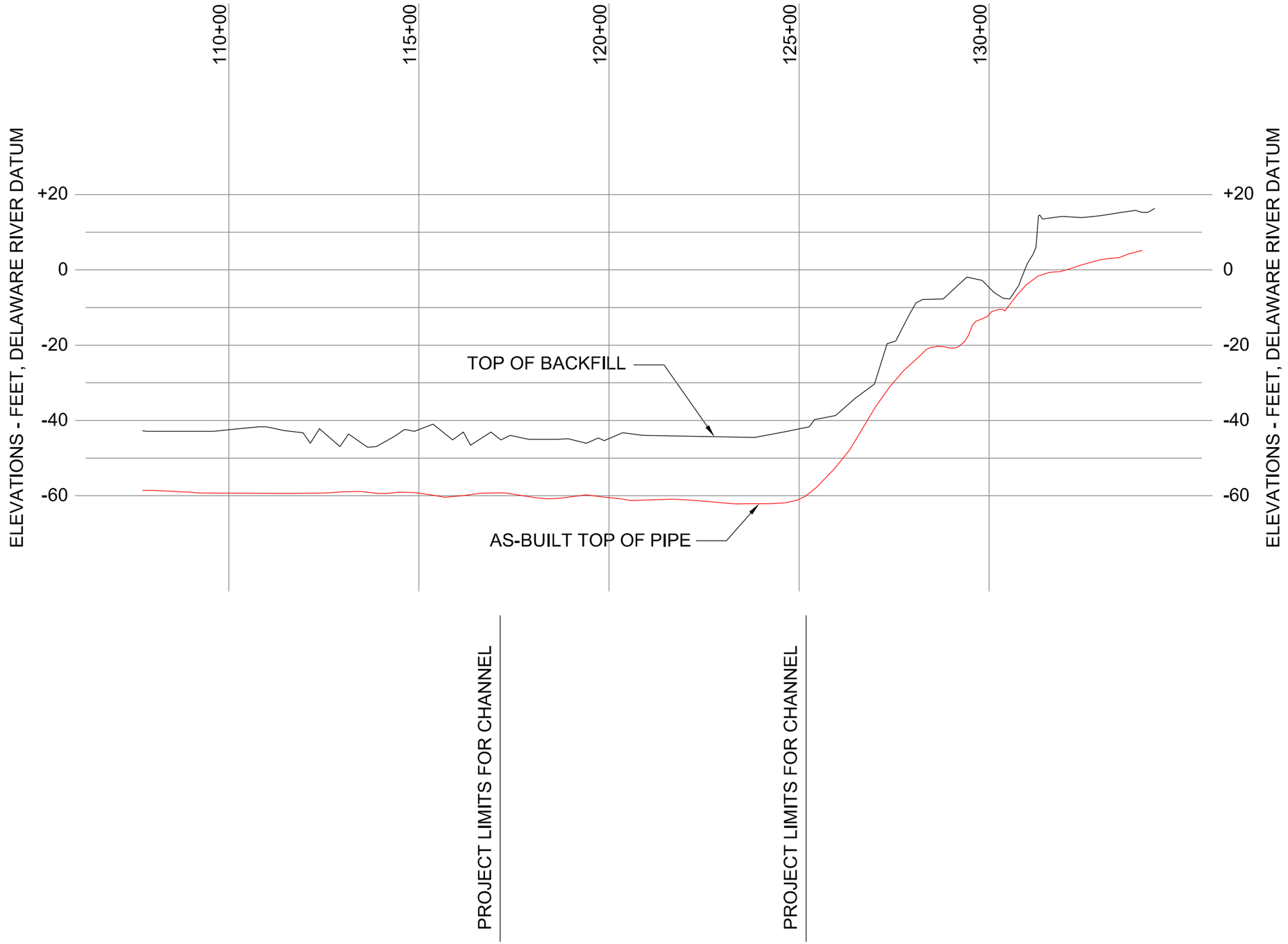
GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. (302) 652–4948
FAX (302) 655–9218
GBAWILMINGTON@GBA–INC.COM

DATA SOURCE: PA COORDINATES FROM LAT/LONG DATA PROVIDED BY TIMOTHY GROSS, COLONIAL PIPELINE COMPANY. NJ COORDINATES FROM HYDROGRAPHIC SURVEY BY PHOENIX SOLUTIONS DATED JUNE 2, 2008.

PLAN VIEW
COLONIAL 10" PIPELINES

12/19/2011

FIGURE 1



GBA
ENGINEERS ★ SURVEYORS
GAHAGAN & BRYANT ASSOCIATES, INC.
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807–1195
TEL. (302) 652–4948
FAX (302) 655–9218
GBAWILMINGTON@GBA–INC.COM

DATA SOURCE: COLONIAL PIPELINE COMPANY
AS-BUILT PLAN & PROFILE
FILE NO. C53-400-130, FIG. 49
DRAWING DATE: SEPTEMBER 2, 1965

DETAIL: AS-BUILT TOP OF PIPE PROFILE

12/19/2011

FIGURE 2

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 11, 2012

Greg Herbstritt
Colonial Pipeline Company
Field Project Manager
1089 Kings Highway
West Deptford, NJ 08086

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Herbstritt:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

Colonial Pipeline was contacted by me on December 19, 2011, to request supplemental information about two known utility crossings within Reaches A-A and A. The known crossings, both in Reach A, were identified as one 10" pipeline (in an inactive or "standby" mode) and one active 10" pipeline crossing the channel at approximately Channel Stations 66+140 and 66+130, respectively. An as-built drawing of the active line (attached) had been previously provided to me by the Corps. On March 14, 2012, you subsequently provided me with an as-built drawing for the standby line (attached).

A review of the as-built drawing for the active 10" pipeline shows:

- The vertical datum used corresponds to the Delaware River Datum (DRD).
- The minimum depth of the top of pipe crossing the channel appears to be -58' DRD.
- Conversion of the above depth to the project datum equates to -58.9' MLLW.

A review of the as-built drawing for the 10" standby pipeline shows:

- The vertical datum used corresponds to the Delaware River Datum (DRD).
- The minimum depth of the top of pipe crossing the channel appears to be -58.5' DRD.
- Conversion of the above depth to the project datum equates to -59.4' MLLW.

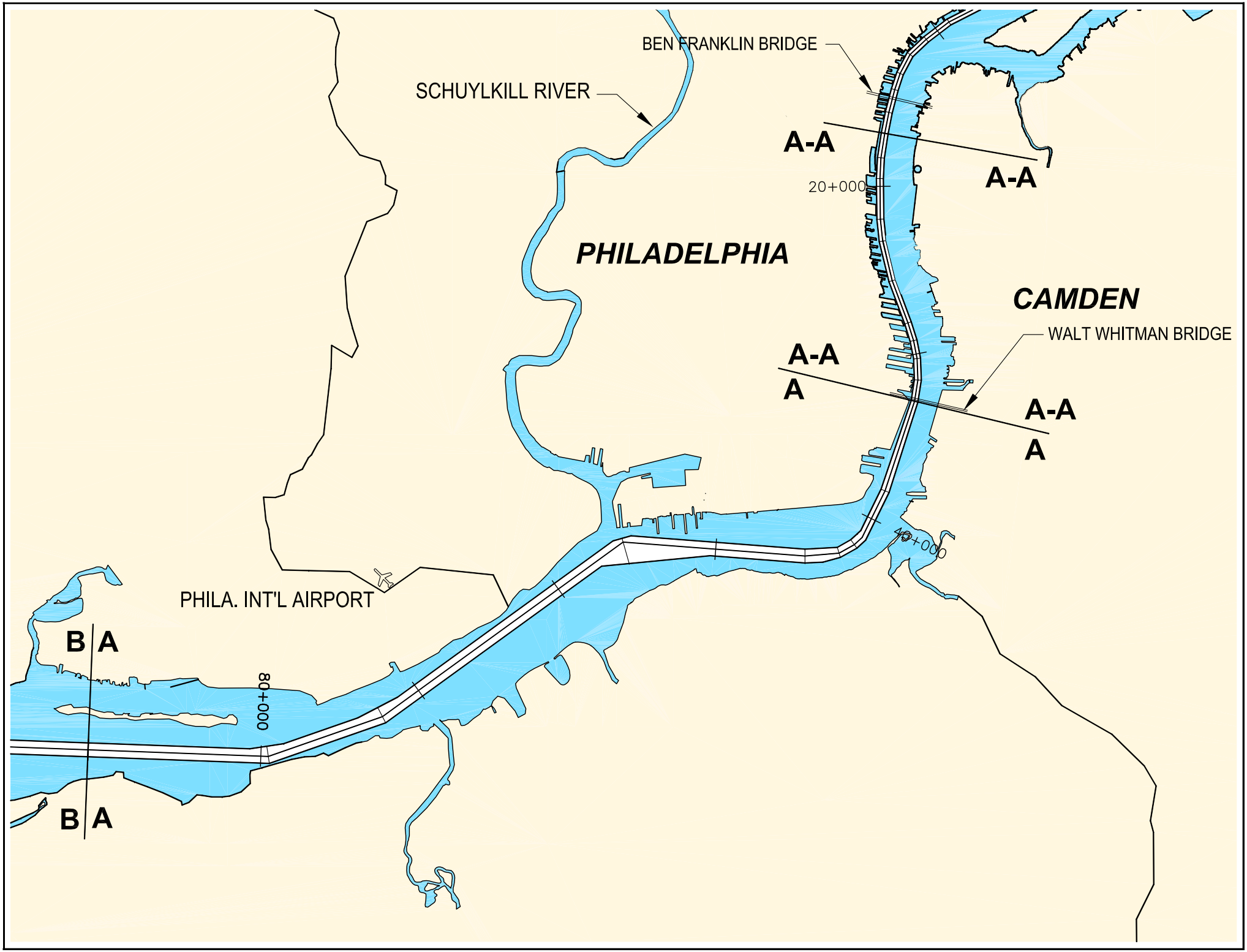
If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information referenced above properly documents the status and location of the utilities. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

COLONIAL PIPELINE [U2(2)]

Utility U2 – 10” Gas Pipeline
As-Built Drawing

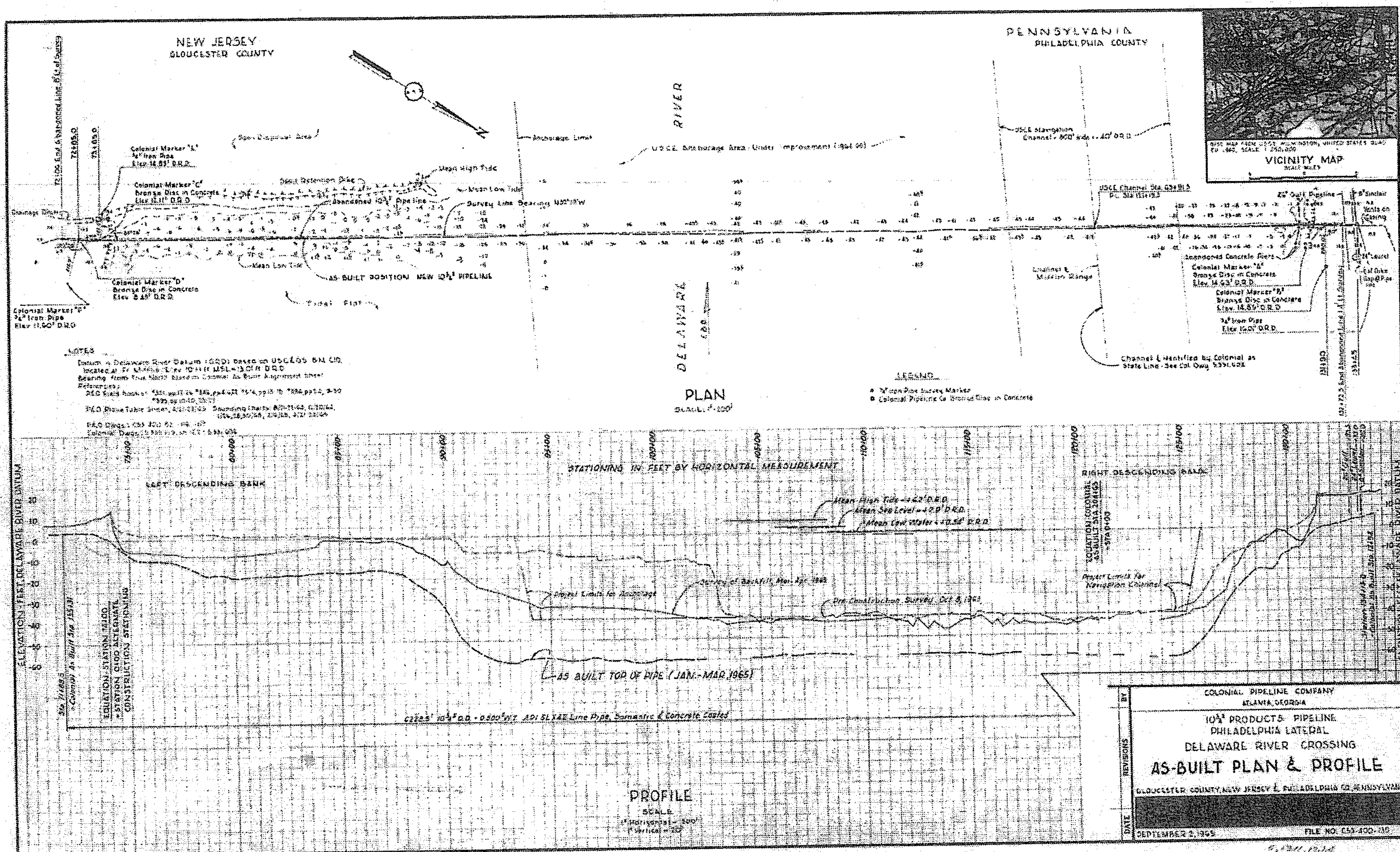
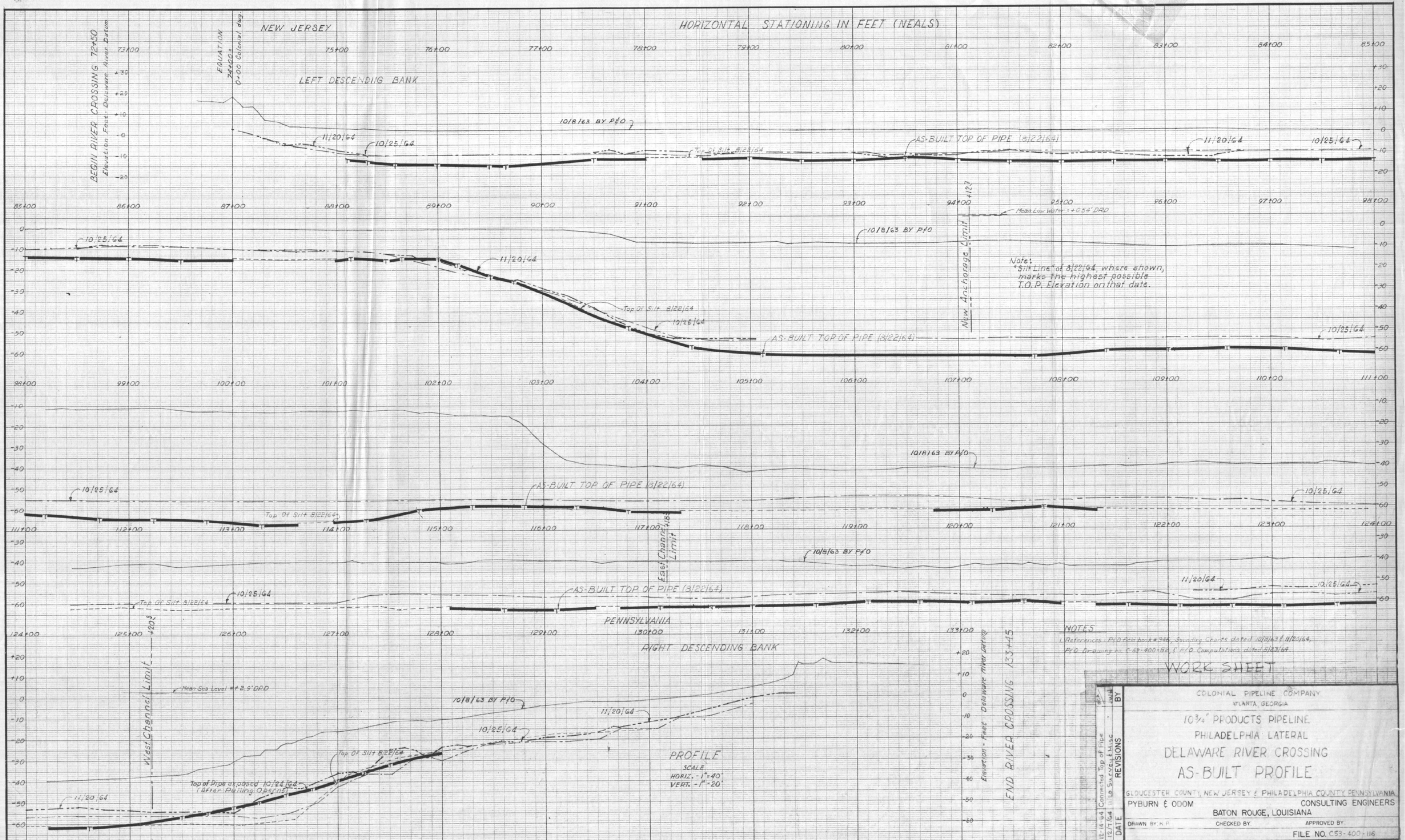

NEW JERSEY
GLOUCESTER COUNTY
PENNSYLVANIA
PHILADELPHIA COUNTY
DELAWARE
RIVER
VICINITY MAP
PLAN
LEGEND
NOTES
AS-BUILT POSITION NEW 10¾" PIPELINE
STATIONING IN FEET BY HORIZONTAL MEASUREMENT
LEFT DESCENDING BANK
RIGHT DESCENDING BANK
ELEVATION-FEET DELAWARE RIVER DATUM
AS BUILT TOP OF PIPE (JAN.-MAR 1965)
PROFILE
COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA
10¾" PRODUCTS PIPELINE
PHILADELPHIA LATERAL
DELAWARE RIVER CROSSING
AS-BUILT PLAN & PROFILE
GLOUCESTER COUNTY, NEW JERSEY & PHILADELPHIA CO. PENNSYLVANIA
SEPTEMBER 2, 1965
FILE NO. C53-400-130
BY
REVISIONS
DATE

Fig 49

COLONIAL PIPELINE [U(2)]

Utility U – 10” Gas Pipeline (Inactive)
As-Built Drawing


HORIZONTAL STATIONING IN FEET (NEALS)
NEW JERSEY
BEGIN RIVER CROSSING 72+50
Elevation Feet - Delaware River Datum
EQUATION
74+00 = 0+00 Colonial dwg.
LEFT DESCENDING BANK
10/8/63 BY P&O
11/20/64
10/25/64
AS-BUILT TOP OF PIPE (8/22/64)
Top Of Silt 8/22/64
New Anchorage Limit +127
Mean Low Water = +0.54' DRD
Note:
"Silt Line" of 8/22/64, where shown, marks the highest possible T.O.P. Elevation on that date.
East Channel Limit +18
PENNSYLVANIA
RIGHT DESCENDING BANK
West Channel Limit +20
Mean Sea Level = +2.9' DRD
Top of Pipe exposed 10/24/64 (After Pulling Operations)
PROFILE
SCALE
HORIZ. - 1" = 40'
VERT. - 1" = 20'
Elevation - Feet - Delaware River Datum
END RIVER CROSSING 133+45
NOTES
1. References: P&O field book # 346, Sounding Charts dated 10/8/63 & 11/20/64, P&O Drawing No. C-53-400-60 & P&O Computations dated 5/23/64.
WORK SHEET
COLONIAL PIPELINE COMPANY
ATLANTA, GEORGIA
10¾" PRODUCTS PIPELINE
PHILADELPHIA LATERAL
DELAWARE RIVER CROSSING
AS-BUILT PROFILE
GLOUCESTER COUNTY, NEW JERSEY & PHILADELPHIA COUNTY, PENNSYLVANIA
PYBURN & ODOM
CONSULTING ENGINEERS
BATON ROUGE, LOUISIANA
DRAWN BY H.P.
CHECKED BY
APPROVED BY
FILE NO. C53-400-116
DATE
REVISIONS
BY
12/16/64 Corrected Top of Pipe
12/7/64 Add Surveys & Misc.

-KEEP-

PHILLIPS 66
Formerly ConocoPhillips
(in process of being transferred to Monroe Energy, LLC)

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 11, 2012

Laura Schoenberger
ConocoPhillips Company
Corporate Real Estate
Property Tax, Real Estate, Right of Way and Claims
600 N. Dairy Ashford
2W8002C
Houston, TX 77079

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Ms. Schoenberger:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

Your company was initially contacted by me on December 5, 2011, to request information about known crossings within Reaches A-A and A. A company representative identified and provided information for one utility line operated by Conoco Phillips crossing the Delaware River within Reach A. On February 1, 2012, I requested supplemental information to more accurately identify the methodology used for identifying the location and depth of the line. I was referred to Buckeye Partners, which subsequently provided that information. Attached is the information GBA currently has for the 8" pipeline operated by Conoco Phillips and crossing the channel at approximately Channel Station 64+970. A review of the information prompts the following observations, questions and/or concerns:

- The information provided appears to be a hydrographic survey undertaken for the purpose of determining depth of cover over the utility.

- The Pipeline Inspection Report accompanying the survey (provided by Buckeye) indicates the surveyors determine the top of pipeline through the "use of electronic instrumentation and follow that with manual probing to check the accuracy and validity of the electronics", although a discussion of the actual procedures is absent from the report.
- The minimum depth of the top of pipeline crossing the channel as shown on the survey appears to be -52' MSL (the survey datum).
- Benchmark No. 1 (shown on the survey at +14.10' MSL) was recovered by GBA's surveyor and determined to be at elevation +10.94' NAVD88.
- Conversion of the above minimum depth of the top of pipeline to recovery datum equates to -55.16' NAVD88.
- Conversion of that depth to the project datum equates to -52.1' MLLW.
- A permit drawing (attached) associated with a 1965 permit to lower both this 8" line and the 12" line currently operated by Sunoco Logistics within an extension of the anchorage area shows the depth of the top of both pipelines crossing the channel is at a uniform -60' DRD.
- This appears to be the originally permitted depth rather than an as-built depth, which would not exhibit such uniformity.
- Conversion of the above depth to the project datum equates to approximately -60.9' MLLW.
- A comparison of the minimum depth of the top of pipeline derived from the hydrographic survey provided by Conoco Phillips with that from the 1965 permit shows a difference of almost nine (9) feet.
- No as-built drawing has been provided.

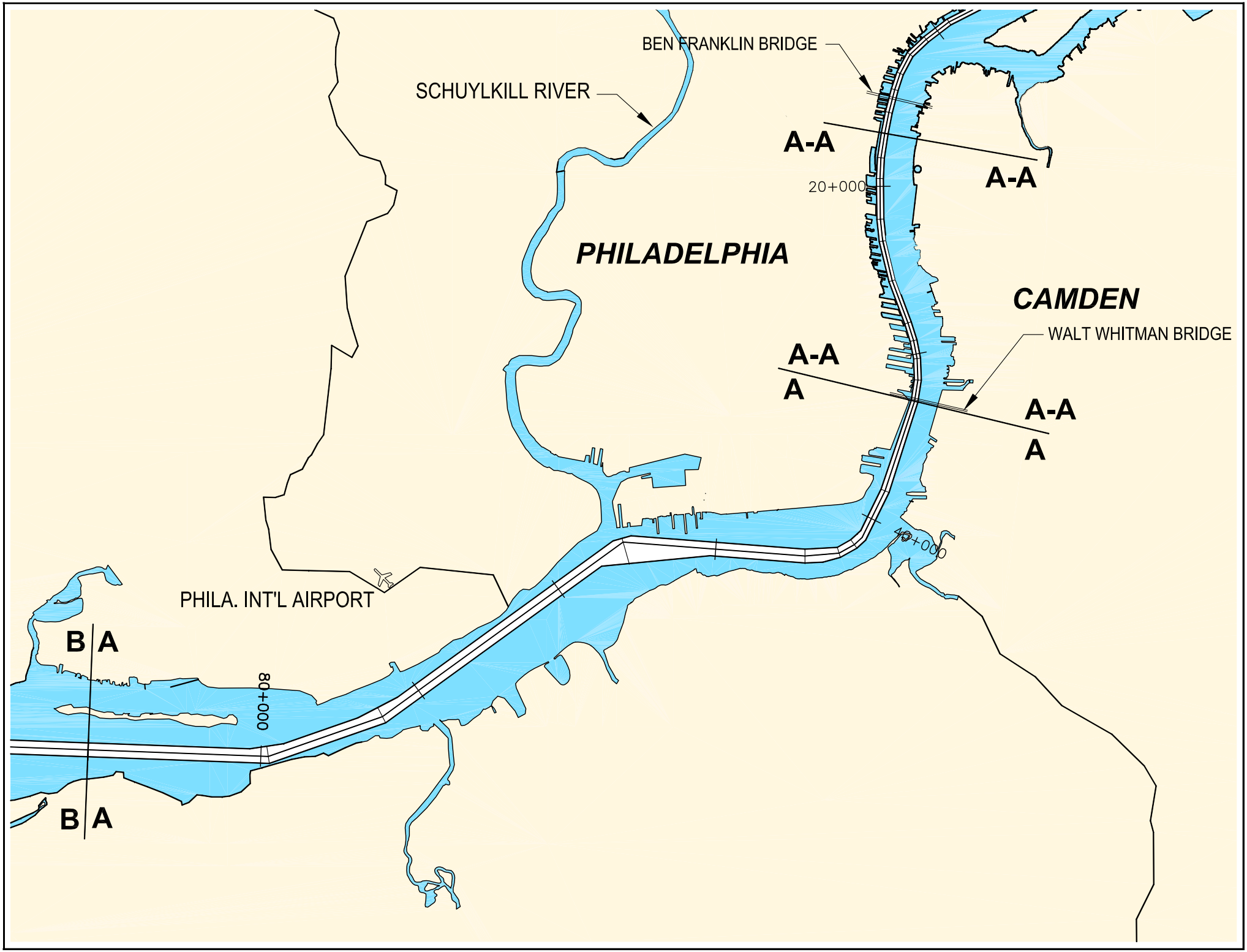
If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information provided by Conoco Phillips and referenced above properly documents the status and location of the utility. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

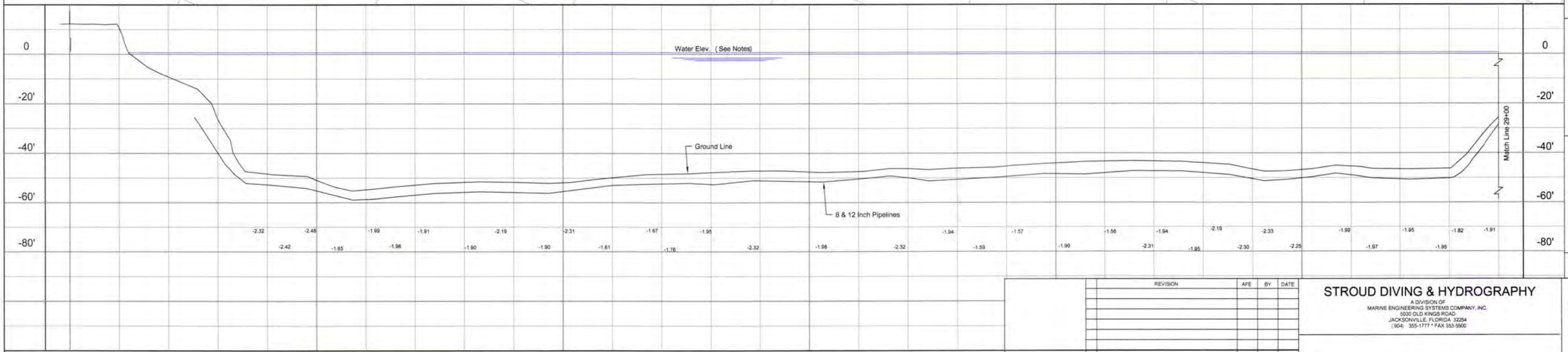
PHILLIPS 66 [V(1)]

Utility V – 8” Pipeline
Depth of Cover Survey

DELAWARE RIVER

PLAN
1"=100'

0+00 5+00 10+00 15+00 20+00 25+00 29+00



LEGEND
- GROUND LINE
- LINE BURIED
- LINE EXPOSED (plan only)
- LINE SUSPENDED (plan only)
- LINE EXP. & OR SUSP. (profile only)
- RIVER WT.
- SPOT ELEVATIONS OR SOUNDINGS (plan only)

Notes:
1. Bench mark established on the south bank at top of concrete marker, 6 inches in dia. at ground level at high bank over route of pipeline. Elevation 14.10 feet.
2. Water elevation was +1.0 feet at time of survey.
3. Pipelines are covered and stable throughout the crossing.
4. Minimum cover consisting of 3 to 6 feet throughout the crossing.
5. Date of inspection, 26 August 2010.
6. USGS Gage - Delaware River below Christine River at Wilmington DE at LAT 39 43' 00.0"N LON -75 30' 59.6"W NAD83 Hydrologic Unit 02040205 0.00 ft ASL NGVD 29

PROFILE
1"=100' HORIZ
1"=20' VERT

Scale (feet)
100' 0 100'

REVISION	AFE	BY	DATE

STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
5030 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32254
(904) 355-1777 * FAX 353-5500

Sheet 1 of 2

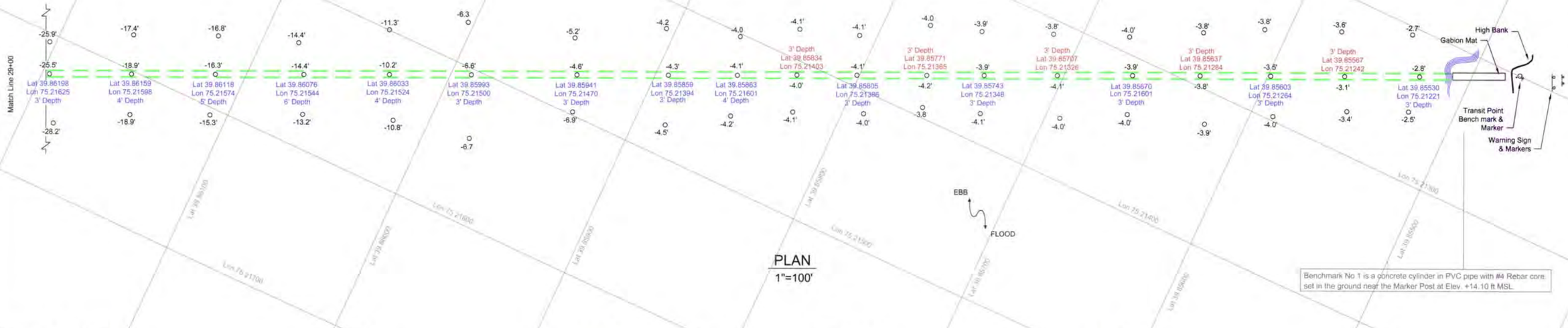
BUCKEYE PARTNERS, L.P.

8 Inch & 12 Inch Pipelines P555XX / XX55JB

Delaware River
Philadelphia, PA

SCALE	
PLAN	1"=100'
PROFILE	1"=20'
DRAWN	R.E. Estes
CHECKED	W.F. Hux
DATE	29 Sep 10
SDH	48-106

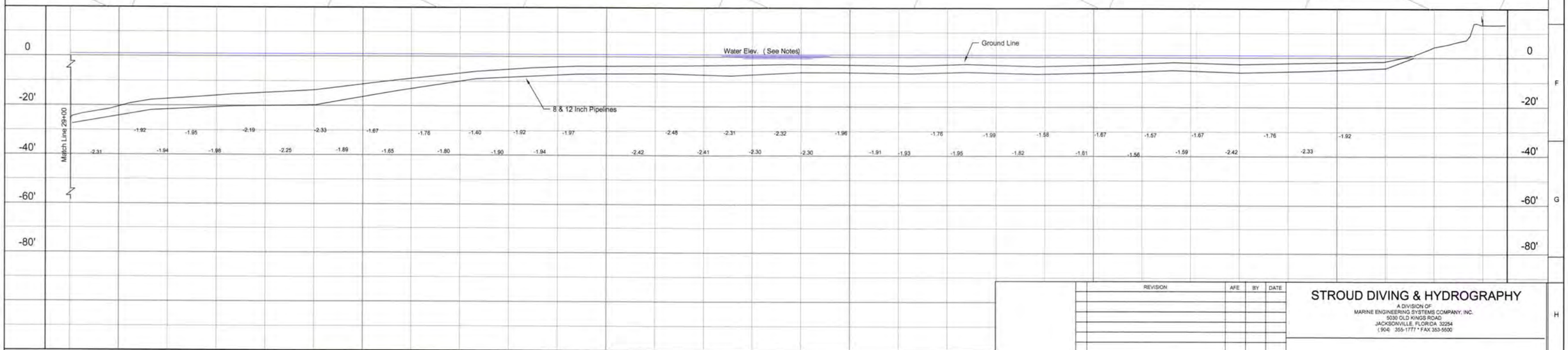
DELAWARE RIVER



PLAN
1"=100'

Benchmark No 1 is a concrete cylinder in PVC pipe with #4 Rebar core set in the ground near the Marker Post at Elev. +14.10 ft MSL.

29+00 30+00 35+00 40+00 45+00 50+00 55+00



PROFILE
1"=100' HORIZ
1"=20' VERT

Scale (feet)
100' 0 100'

LEGEND
- GROUND LINE
- LINE BURIED
- LINE EXPOSED (plan only)
- LINE SUSPENDED (plan only)
- LINE EXP. & OR SUSP. (profile only)
- RIVER WT.
- SPOT ELEVATIONS OR SOUNDINGS (plan only)

REVISION	AFE	BY	DATE

MESCO DIVERS
MARINE ENGINEERING SYSTEMS CO.
STROUD DIVING & HYDROGRAPHY

STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
5030 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32254
(904) 355-1777 * FAX 353-5500

Sheet 2 of 2

BUCKEYE PARTNERS, L.P.

8 Inch & 12 Inch Pipelines P555XX / XX55JB

Delaware River
Philadelphia, PA

SCALE PLAN	1"=100'
PROFILE	1"=20'
DRAWN	R.E. Estes
CHECKED	W.F. Hux
DATE	29 Sep 10
SDH	46-106

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	0-30		
	0-15		
	0+00	14	34
	0+15	14	34
	0+30	13	34
	0+45	12	34
	0+57	10	34
	0+75	9	34
	0+90	8	34
	1+05	5	32
WE	1+20	1	-25
	1+35	-14	-25
	1+50	-14	-25
	1+65	-14	-25
	1+80	-14	-25
	1+95	-14	-25
	2+10	-10	-25
	2+25	-10	-25
	2+40	-10	-25
	2+55	-15	-25
	2+70	-15	-32
	2+85	-18	-36
	3+00	-25	-40
	3+15	-32	-44
	3+30	-36	-46
	3+45	-45	-53
	3+60	-47	-53
	3+75	-48	-53
	3+90	-48	-53
	4+05	-48	-53
	4+20	-48	-53
	4+35	-49	-55
	4+50	-49	-55
	4+65	-49	-55
	4+80	-50	-55
	4+95	-50	-55
	5+10	-51	-55
	5+25	-51	-55
	5+40	-52	-56
	5+55	-55	-59
	5+70	-55	-59
	5+85	-55	-60
	6+00	-55	-60
	6+15	-55	-60
	6+30	-55	-60
	6+45	-55	-60
	6+60	-55	-60
	6+45	-55	-60
	6+60	-55	-60
	6+75	-55	-60
	6+90	-54	-60
	7+05	-52	-59
	7+20	-52	-58
	7+35	-52	-58
	7+50	-51	-57
	7+65	-51	-57
	7+80	-51	-57
	7+95	-51	-55
	8+10	-51	-56
	8+25	-51	-56
	8+40	-51	-56
	8+55	-51	-56
	8+70	-51	-56
	8+85	-51	-56
	9+00	-51	-56
	9+15	-51	-56
	9+30	-51	-56
	9+45	-51	-55
	9+60	-51	-56
	9+75	-51	-56
	9+90	-51	-56

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	10+05	-51	-55
	10+20	-51	-55
	10+35	-50	-55
	10+50	-50	-55
	10+65	-50	-55
	10+80	-50	-55
	10+95	-50	-54
	11+10	-50	-54
	11+25	-50	-54
	11+40	-49	-54
	11+55	-49	-53
	11+70	-49	-53
	11+85	-49	-53
	12+00	-48	-53
	12+15	-48	-53
	12+30	-48	-53
	12+45	-48	-53
	12+60	-48	-53
	12+75	-48	-53
	12+90	-48	-53
	13+05	-48	-53
	13+20	-48	-53
	13+35	-48	-53
	13+50	-48	-53
	13+65	-48	-53
	13+80	-48	-53
	13+95	-48	-53
	14+10	-48	-52
	14+25	-48	-52
	14+40	-48	-52
	14+55	-47	-52
	14+70	-47	-52
	14+85	-47	-52
	15+00	-47	-52
	15+15	-47	-52
	15+30	-47	-52
	15+45	-47	-52
	15+60	-47	-52
	15+75	-47	-52
	15+90	-47	-52
	16+05	-47	-52
	16+20	-47	-52
	16+35	-47	-52
	16+50	-48	-52
	16+65	-45	-50
	16+80	-45	-50
	16+95	-45	-50
	17+10	-45	-50
	17+25	-45	-50
	17+40	-45	-50
	17+55	-45	-51
	17+70	-45	-51
	17+85	-45	-50
	18+00	-45	-50
	18+15	-45	-50
	18+30	-45	-50
	18+45	-45	-51
	18+60	-45	-51
	18+75	-45	-51
	18+90	-45	-51
	19+05	-45	-51
	19+20	-45	-51
	19+35	-45	-51
	19+50	-45	-49
	19+65	-45	-49
	19+80	-45	-49
	19+95	-45	-49
	20+10	-43	-49
	20+25	-43	-49
	20+40	-43	-49
	20+55	-42	-48
	20+70	-42	-48
	20+85	-42	-48
	21+00	-42	-47

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	21+15	-42	-47
	21+30	-42	-47
	21+45	-42	-47
	21+60	-42	-47
	21+75	-42	-47
	21+90	-42	-47
	22+05	-42	-47
	22+20	-42	-47
	22+35	-42	-47
	22+50	-42	-47
	22+65	-42	-47
	22+80	-42	-48
	22+95	-43	-49
	23+10	-43	-50
	23+25	-43	-50
	23+40	-43	-50
	23+55	-43	-50
	23+70	-44	-50
	23+85	-44	-50
	24+00	-45	-50
	24+15	-45	-50
	24+30	-45	-50
	24+45	-46	-51
	24+60	-46	-51
	24+75	-46	-51
	24+90	-46	-51
	25+05	-46	-51
	25+20	-46	-51
	25+35	-46	-51
	25+50	-45	-49
	25+65	-45	-49
	25+80	-45	-49
	25+95	-45	-49
	26+10	-44	-49
	26+25	-44	-49
	26+40	-44	-49
	26+55	-44	-49
	26+70	-44	-51
	26+85	-44	-51
	27+00	-44	-51
	27+15	-44	-51
	27+30	-44	-51
	27+45	-45	-51
	27+60	-45	-51
	27+75	-45	-51
	27+90	-45	-51
	28+05	-45	-51
	28+20	-45	-51
	28+35	-44	-51
	28+50	-40	-45
	28+65	-38	-44
	28+80	-32	-44
	28+95	-28	-37
	29+10	-25	-32
	29+25	-24	-30
	29+40	-24	-30
	29+55	-24	-30
	29+70	-22	-29
	29+85	-22	-28
	30+00	-20	-27
	30+15	-20	-26
	30+30	-19	-25
	30+45	-18	-23
	30+60	-18	-23
	30+75	-18	-23
	30+90	-18	-24
	31+05	-18	-24
	31+20	-18	-24
	31+35	-18	-23
	31+50	-18	-23
	31+65	-18	-23
	31+80	-18	-23
	31+95	-17	-22

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE
	32+10	-17	-21
	32+25	-16	-21
	32+40	-16	-20
	32+55	-16	-20
	32+70	-16	-20
	32+85	-16	-20
	33+00	-15	-20
	33+15	-15	-20
	33+30	-15	-20
	33+45	-15	-20
	33+60	-15	-20
	33+75	-15	-20
	33+90	-15	-20
	34+05	-14	-20
	34+20	-14	-20
	34+35	-14	-20
	34+50	-14	-20
	34+65	-14	-20
	34+80	-14	-20
	34+95	-12	-20
	35+10	-12	-20
	35+25	-12	-17
	35+40	-12	-17
	35+55	-10	-16
	35+70	-10	-16
	35+85	-10	-15
	36+00	-09	-14
	36+15	-09	-14
	36+30	-09	-14
	36+45	-09	-14
	36+60	-09	-14
	36+75	-09	-14
	36+90	-09	-13
	37+05	-08	-13
	37+20	-08	-13
	37+35	-08	-13
	37+50	-08	-13
	37+65	-08	-13
	37+80	-08	-13
	37+95	-05	-13
	38+10	-05	-13
	38+25	-05	-10
	38+40	-05	-10
	38+55	-04	-10
	38+70	-04	-10
	38+85	-04	-10
	39+00	-04	-10
	39+15	-04	-10
	39+30	-04	-10
	39+45	-04	-10
	39+60	-04	-10
	39+75	-04	-10
	39+90	-04	-10
	40+05	-04	-10
	40+20	-04	-10
	40+35	-04	-10
	40+50	-04	-10
	40+65	-04	-10
	40+80	-04	-10
	40+95	-04	-10
	41+10	-04	-10
	41+25	-04	-10
	41+40	-04	-10
	41+55	-04	-10
	41+70	-04	-10
	41+85	-04	-10
	42+00	-04	-10
	42+15	-04	-10
	42+30	-04	-10
	42+45	-04	-10
	42+60	-04	-10
	42+75	-04	-10
WE	42+88	-04	-10
	43+05	-04	-10
	43+20	-04	-10

LOCATION	STATION	ELEV. OF GRADE ABOVE PIPE	ELEV. OF TOP OF PIPE

REVISION	AFE	BY	DATE

MERCO DIVERS
MARINE ENGINEERING SYSTEMS CO.
STROUD DIVING & HYDROGRAPHY

STROUD DIVING & HYDROGRAPHY
A DIVISION OF
MARINE ENGINEERING SYSTEMS COMPANY, INC.
9530 OLD KINGS ROAD
JACKSONVILLE, FLORIDA 32257
(904) 355-1777 * FAX 353-5500

DELAWARE RIVER

TABLE DATA

BUCKEYE PARTNERS, L.P.

8 Inch & 12 Inch Pipelines P555XX / XX55JB

Delaware River
Philadelphia, PA

SCALE
PLAN 1"=100'
PROFILE 1"=20'
DRAWN R E Estes
CHECKED W F Hall
DATE 29 Sep 10
SCH 48-106

PHILLIPS 66 [V(2)]

Utility V – 8” Pipeline
Pipeline Inspection Report

Stroud Diving & Hydrography
A Division of Marine Engineering Systems Co.

PIPELINE INSPECTION REPORT

Buckeye Pipeline LLC
2010 Waterway Crossing Inspection

8" Philadelphia Jct-Paulsboro
Delaware River
Philadelphia, Pennsylvania
Philadelphia County

Prepared by:
Gilbert H. Balmaceda
ISN ID: 893759
Veriforce No: gb-031077-01

Date: September 21, 2010

Job Number: SDH 48-106

Project:	Report Date:	
	Reviewed by: Will F. Hux, Mechanical Engineer	

PIPELINE INSPECTION REPORT

CUSTOMER:	Buckeye Pipeline LLC	**LOCATION:**	Delaware River
ESCORT:	n/a		
JOB # : SDH	48-106	**DATE :**	**8/26/2010**

JOB SPECIFICATIONS: The route of the pipeline was surveyed across the waterway to include both banks. The width across the waterway is depicted on the drawing, at the time of the survey. A benchmark was established on the south bank at top of concrete marker, 6 inches in diameter at ground level at high bank over route of pipeline. The elevation was assumed as 0.00 feet for future reference. Water elevation at the time of the inspection is depicted on the drawing. Refer to drawing number SDH 48-106 for details concerning the plan and profile views.

SOUTH BANK: The bank is has a steep slope from its high bank down to water's edge. The bank area is mud and covered with light vegetation. There is a concrete mat covering the pipeline from water's edge to high bank. The right-of-way from high bank is recently mowed.

NORTH BANK: The bank has a steep slope from its waters edge to the high bank. The bank area is rocky with heavy vegetation and trees. Continuing down the right-of-way from the high bank is clear and goes under a fence line then to the airport property.

WARNING SIGNS & MARKERS: There were warning signs located on both banks on the inspection site. Pipeline markers and warning signs were in good condition.

UNDERWATER INVESTIGATION RESULTS: The bottom across the waterway is mud. There was no mentionable debris covering the route of the pipeline. The crossing was deep with a light current during the time of the inspection.

PERTINENT ENVIRONMENTAL CONDITIONS

Water depth is depicted on the drawing, Air temp $\approx 72^{o}$F with visibility 10 miles, partly cloudy.

SUMMARY OF FINDINGS: The pipeline was found to be covered and stable throughout the crossing. There were no other conditions found in the waterway that would affect the integrity of the pipeline.

RECOMMENDATIONS: None

PERSONNEL :		ISN ID #	VERIFORCE ID#
Crew Supervisor:	Robert E. Estes	00685024	
Surveyor :	Patrick McCroskey	01456511	
Dive Tender :	Gilbert H Balmaceda	0893759	

Customer Representative : n/a

EQUIPMENT AVAILABLE:

Sub-Bottom Profiler -	Imagenex DF1030	s/n 0712
Side Scan Sonar -	Imagenex SideScan	s/n 1413
Pipeline Locating Instrument -	Vivax v Loc Pro	s/n PD11918USA
Hydrographic Recorder -	Raytheon Fathometer	s/n V05079
Surveying Instrument -	Leica Builder RM200	s/n D20816
Data Logger	Trimble GeoXH DGPS Processing Software & Survey	

PROCEDURE USED:

HYDROGRAPHIC SURVEY AND INSPECTION

Purpose

The primary purpose for the inspection and hydrographic survey is to detect pipeline exposure and/or damage, and to gather and record information relative to its existing location and elevation. Report the conditions and any adverse conditions on the pipeline.

Procedures

Inspection

A diver, experienced in inspection of underwater pipelines, traversed the bottom of the waterway searching an area within twenty-five (25) feet of either side of the pipeline for exposed pipe, logs, or other debris.

A. Recorded any external forces or strong turbulence which may subject the pipe to unusual stress.

B. Recorded any debris, log or entrapped objects in vicinity of the pipeline.

C. Recorded the length and location of any uncovered portions of pipeline. Inspect all uncovered portions of the pipeline for damage to the pipe and/or coating. **If exposed pipe or a potentially dangerous situation is found during the inspection, the Contractor's field supervisor and/or the Company inspector must immediately notify the Company's District Engineer or Engineering Departments.**

Surveying

Horizontal Alignment

A. **HORIZONTAL LOCATION** of the pipeline was by electronic means at a maximum interval of 15 feet across the waterway and on the shore for a distance greater than or equal to fifty (50) feet from the high water line or from the top of the bank, whichever is greater. Additional points were established if pipeline side bends are encountered.

B. **OFF SET MEASUREMENTS** from the pipeline shall be taken to all permanent, physical features (valves, structures, bench marks, etc.) within the area twenty-five (25) feet of either side of the pipeline.

C. Stake numbers shall be assigned to offset measurements, elevation points for top of pipe, bottom of waterway, etc., and physical features such as valves, top of bank, water's edge, fences, etc. Stake numbers shall be based upon or tied into the Company atlas stake numbers for the pipeline being surveyed.

D. The survey baseline is over the top of the pipeline or, as close as is practical.

E. Established an angle of crossing between the pipeline and the waterway.

Elevations

A. Elevations are taken on the **EXISTING GRADE** over the pipeline every fifteen (15) feet across the waterway and on the shore for a distance greater than or equal to fifty (50) feet from the high water line or from top of bank, whichever is greater. Additional elevations obtained at major grade changes.

B. Elevations of all permanent **PHYSICAL FEATURES** within twenty-five (25) feet of either side of the pipeline shall be taken.

C. Elevations are tied into temporary benchmarks established during the last water crossing survey and/or into USGS or other governmental datum benchmarks if those benchmarks are close to the crossing.

D. A new benchmark, with an assumed elevation of 00.00 feet, shall be established if tying into previous temporary or other datum is not possible. The new benchmark shall be in a location which will have a high probability of surviving until the next inspection (5 years). The benchmark should be established on a bridge abutment, tower leg, and concrete foundation. If such structures are not available, a concrete monument must be set. The concrete monument should be located in stable soil beyond the high water level, be within the width of the right-of-way, and not closer than ten (10) feet to the nearest pipeline.

E. Recorded the elevation of the water and the time of survey. Determine mean high and mean low water elevations, and maximum (spring) high tide line in tidal waters.

Elevations - Top of Pipeline

A. Determined the depth of cover every fifteen (15) feet across the waterway and on the shore for a distance greater than or equal to fifty (50) feet from the high water line or from the top of bank, whichever is greater. Additional elevations shall be obtained at major grade changes.

B. Depth of cover may be determined by jet or manual probing. Probe tips must be designed and constructed of materials which will not damage the pipeline coating. The Company reserves the right to reject probes which, in its sole judgment, will damage the pipeline coating. We use electronic instrumentation and follow that with manual probing to check the accuracy and validity of the electronics.

C. The cover may be determined by electronic means if type of bottom cover prevents probing. Location of top of pipe must be within an accuracy of plus or minus 10 percent and should be verified by probing at two locations.

D. Top of pipe elevations are plotted on the elevation matrix on the drawings.

STRUCTURE TO ELECTROLYTE SURVEY

This specification shall be used for the acquisition of structure to electrolyte voltage potentials along pipelines submerged under lakes, rivers, etc., while being visually inspected by divers in concert with a third party contractor for Buckeye Pipeline LLC.

Purpose

A survey of potentials between the electrolyte and pipeline indicates the effectiveness of our cathodic protection system.

The data acquired can be used to evaluate coating quality and locate potential problem areas.

Procedure

Locate a cathodic protection test station on one side of the water crossing. As the diver traverses the line, voltage potential readings shall be recorded at every 5·foot interval.

Data Recording

Voltage potential readings were recorded at each 5 foot interval.

Pipeline station numbers shall be recorded for the points where data recording begins and ends.

These station numbers were tied into the Company's pipeline station numbers.

The line section of piping was recorded along with the date when the data was recorded.

Direction in which the survey data was recorded was recorded, i.e., North to South, East to West.

Reporting

All was recorded and submitted to the Company's local corrosion specialist or other representative for review after each day's work.

NOTES:

PIPELINE INSPECTION REPORT

South Bank high bank looking south towards warning sign and right of way

South bank looking north towards water's edge and concrete mat.

Project:	Report Date:	
	Reviewed by: Will F. Hux, Mechanical Engineer	

South Bank 1000' off water's edge .

500'of f water's edge looking to north bank and warning sign.

Project:	Report Date:	
	Reviewed by: Will F. Hux, Mechanical Engineer	

SUMMARY OF FINDINGS:

Name of Body of Water: Delaware River

Pipeline Designation:

Nominal Line Size: 8"
Responsibility #:
Location Code:
Topo Map#:
Stake #:

Location:

State: PA
County, Township, Etc.: Philadelphia County
Nearest Town, City, Etc.: Tinicum township
Name of Nearest Access Road: Fort Mifflin Rd
Dist. From Nearest Access Road: 100 feet
Name of Nearest Boat Ramp: Private boat ramp
Est. Dist. To Boat Ramp from Crossing: 2 miles west

Contact Information:

Contractor Name: Stroud Diving & Hydrography
Customer Job #: SDH 48-106

Survey Information:

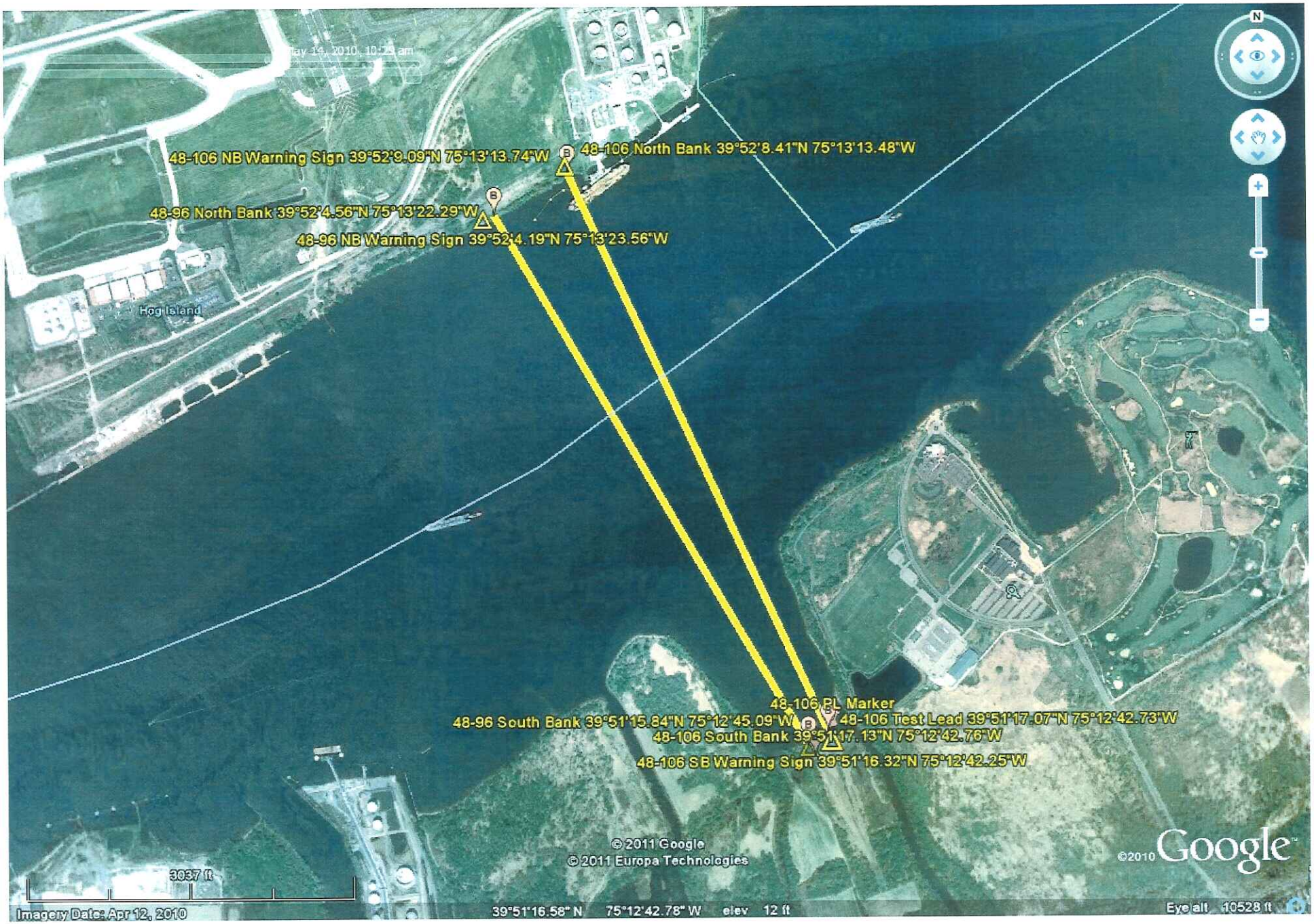
Survey Start Date: 08/26/2010
Survey Completion Date: 08/26/2010
Survey Crew Chief Name: Robert E Estes
Principal Diver's Name: Eric Tomsha
Company Inspector Name:
Est. Current Velocity: <1 knot
Direction: north to south
Bottom Composition: Mud
Length of Line over Water: 4168 feet
Width of Waterway: 4168 feet
Max. Water Depth at Time of Survey: 53 ft
Weather Conditions: Partly Cloudy

Survey Findings:

Exposed Pipe Found: No
Coating Damage: No
Pipe Damage: No
Debris on or Near Pipeline: None

* See notes in body of report.
** See notes in body of report.

GPS Coordinates from Trimble GeoXH
48-106 NB Warning Sign 39°52'9.09"N 75°13'13.74"W
48-106 North Bank 39°52'8.41"N 75°13'13.48"W
48-106 South Bank 39°51'17.13"N 75°12'42.76"W
48-106 Test Lead 39°51'17.07"N 75°12'42.73"W
48-106 SB Warning Sign 39°51'16.32"N 75°12'42.25"W


48-106 NB Warning Sign 39°52'9.09"N 75°13'13.74"W
48-106 North Bank 39°52'8.41"N 75°13'13.48"W
48-96 North Bank 39°52'4.56"N 75°13'22.29"W
48-96 NB Warning Sign 39°52'4.19"N 75°13'23.56"W
Hog Island
48-106 PL Marker
48-96 South Bank 39°51'15.84"N 75°12'45.09"W
48-106 Test Lead 39°51'17.07"N 75°12'42.73"W
48-106 South Bank 39°51'17.13"N 75°12'42.76"W
48-106 SB Warning Sign 39°51'16.32"N 75°12'42.25"W
© 2011 Google
© 2011 Europa Technologies
©2010 Google
3037 ft
Imagery Date: Apr 12, 2010
39°51'16.58" N 75°12'42.78" W elev 12 ft
Eye alt 10528 ft

PHILLIPS 66 [V(3)]

Utility V – 8” Pipeline
Corps Permit to Lower Part of Line

DEPARTMENT OF THE ARMY

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining State assent to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago*, 188 U. S., 410.)

NAPOP-N 10—18108-8

PERMIT

U. S. Army Engineer District, Philadelphia, Corps of Engineers.
Custom House, Philadelphia, Pennsylvania 19106
9 February, 1965

Sinclair Pipe Line Company
Sinclair Bldg., Independence, Kansas
Gulf Oil Corporation
P.O. Box 7408, Phila., Pa.

Gentlemen:

Referring to written request dated 28 September 1964 by Mr. Lewis B. Moon, Vice President, -

I have to inform you that, upon the recommendation of the Chief of Engineers, and under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of the Army.

to lower a section of each of your existing submarine pipelines, the pipeline trench to be backfilled with suitable heavy material, all dredging and disposal operations to be performed to the satisfaction of the District Engineer, - - - -
(Here describe the proposed structure or work.)

in and across the Delaware River -
(Here to be named the river, harbor, or waterway concerned.)

at between the Philadelphia International Airport, Tinicum Township, Delaware County, Pennsylvania and a point opposite in West Deptford Township, Gloucester County, New Jersey, -
(Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)

in accordance with the plans shown on the drawing attached hereto marked:
(Or drawings; give file number or other definite identification marks.)

"800.6(Delaware River - Sinclair Pipe Line Co. - No. 1) E-1" - - - - - - - - - -

subject to the following conditions:

(*a*) That the work shall be subject to the supervision and approval of the District Engineer, Corps of Engineers, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment the interests of navigation so require.

(*b*) That any material dredged in the prosecution of the work herein authorized shall be removed evenly and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material in the waterway. If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, New York City.

(*c*) That there shall be no unreasonable interference with navigation by the work herein authorized.

(*d*) That if inspections or any other operations by the United States are necessary in the interest of navigation, all expenses connected therewith shall be borne by the permittee.

(*e*) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure.

(*f*) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required upon due notice from the Secretary of the Army, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of the Army may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(*g*) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(*h*) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the U. S. Coast Guard, shall be installed and maintained by and at the expense of the owner.

(*i*) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(*j*) That if the structure or work herein authorized is not completed on or before 31st day of December, 1947, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

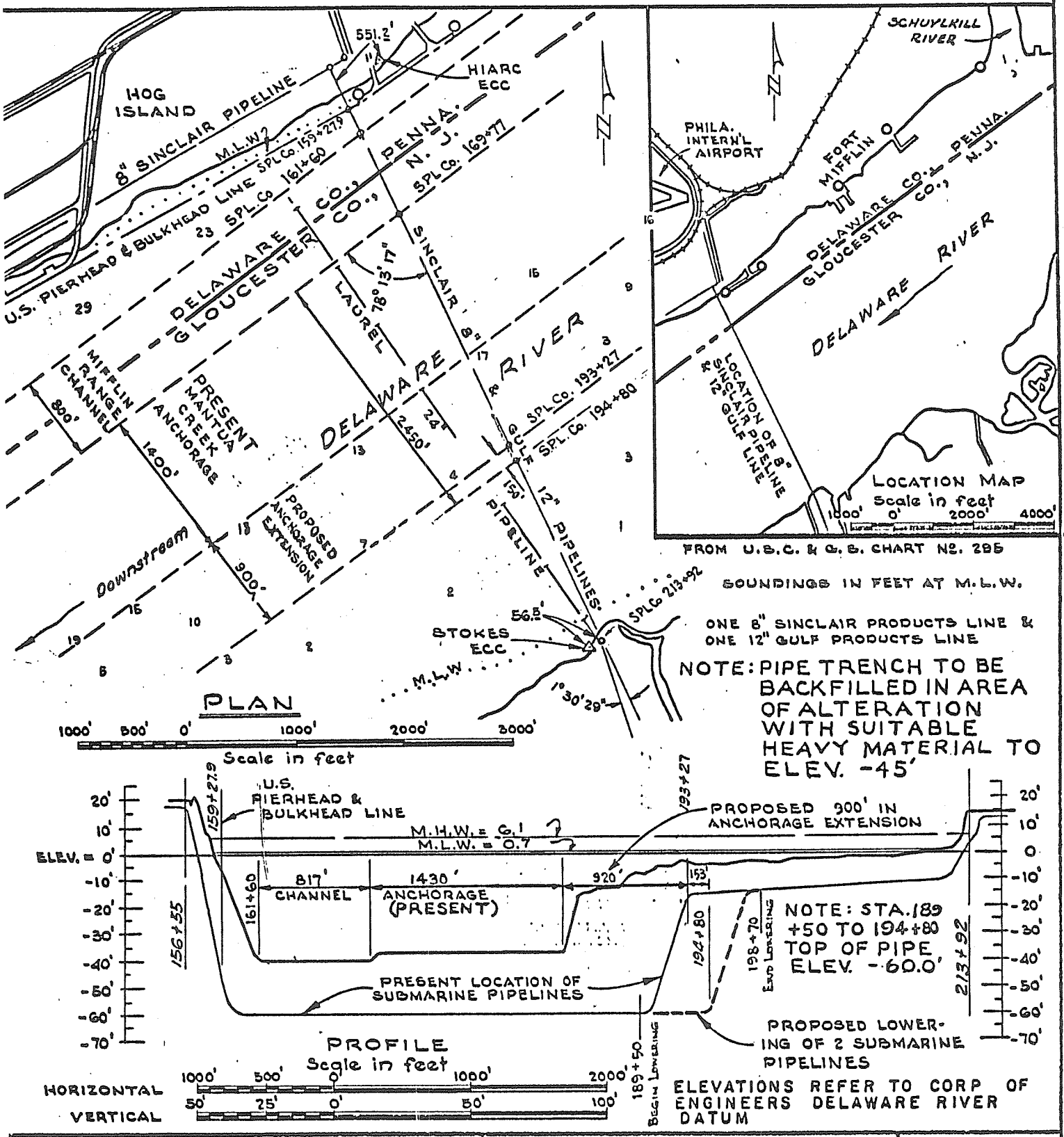
By authority of the Secretary of the Army:

E. P. YATES
Colonel, Corps of Engineers
District Engineer

9 Feb

ENG FORM 1 SEP 48 1721 (Civil) This form supersedes ED Form 90, dated 1 Apr 48, which may be used until exhausted.
EDM 1145-2-308
U. S. GOVERNMENT PRINTING OFFICE 16—15168-8

800.6(Delaware River - Sinclair Pipe Line Co. - No. 1) E-1



SINCLAIR PIPE LINE COMPANY

INDEPENDENCE, KANSAS

PROPOSED LOWERING OF SUBMARINE PIPELINES OF SINCLAIR PIPE LINE CO. & OF GULF OIL CORP. ACROSS DELAWARE RIVER FROM DEL. CO., PENNA. TO GLO. CO., N.J.

DATE	DRAWN
5-19-64	BAER
SCALE AS SHOWN	CH'CK'D T.E.H.
1.118.3A	

Rev 11-6-64

WILLIAMS GAS PIPELINE TRANSCO

Gahagan & Bryant Associates, Inc.
5803 Kennett Pike, Suite D
Centreville Square
Wilmington, DE 19807-1195
(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

November 21, 2011

Williams Gas Pipeline Transco

Attention: Mr. Richard Ricketts
Via E-Mail: richard.r.ricketts@williams.com

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Ricketts:

As you are aware, the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. The next sections of the channel to be dredged are areas known as Reaches A-A and A, which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of a portion of these areas will begin sometime in the calendar year 2012.

Gahagan & Bryant Associates, Inc. (GBA) has been contracted by the Philadelphia Regional Port Authority (PRPA), the non-Federal sponsor of the deepening project, to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations. To that end, the Corps has provided GBA with copies of e-mail correspondence from you containing Lat/Long data for the crossing of two 10" gas pipelines and an as-built survey of the crossing prepared by the Transcontinental Gas Pipe Line Corporation (Transco) after the utility lines were installed. Attached are a diagram of the general location of Reaches A-A & A, and figures showing plan and profile views of the utility crossings. Figure 1 shows the approximate location of your submarine utility crossings based upon Lat/Long information you provided to the Corps (for "Plant A"). The Lat/Long information has been converted to New Jersey State Plane coordinates. Figure 2 shows a profile of the crossings in the navigation channel, and is based upon the as-built survey shown on Transco's Drawing No. G-1966 (from 1963).

GBA is requesting that you examine the attached plan and profile views of the above referenced utility crossings and either acknowledge in writing their veracity or provide the necessary corrections. We would also like you to identify any additional crossings, active or inactive, your company may own/operate within Reaches A-A and A that are not shown on the attached drawings.

If you have any questions on the purpose of this investigation or the deepening project, please contact Mr. Scott Evans, Corps of Engineers Project Manager for the deepening project. He can be reached at (215) 656-6680.

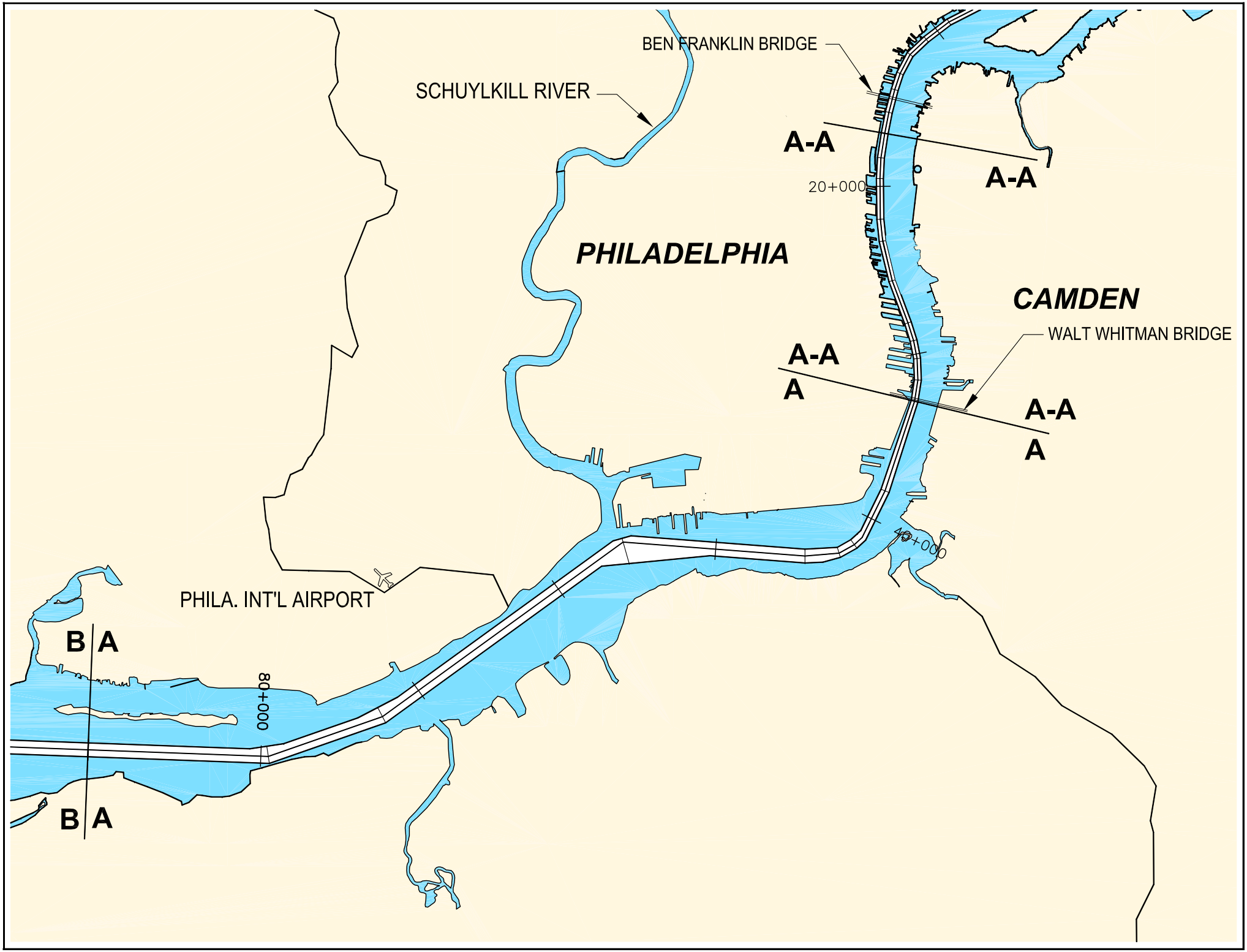
If you have any questions or would like to schedule a meeting to review the attached information, please call me at (302) 652-4948 or contact me by e-mail at rdhenry@gba-inc.com.

We appreciate your assistance in this verification process.

Sincerely,

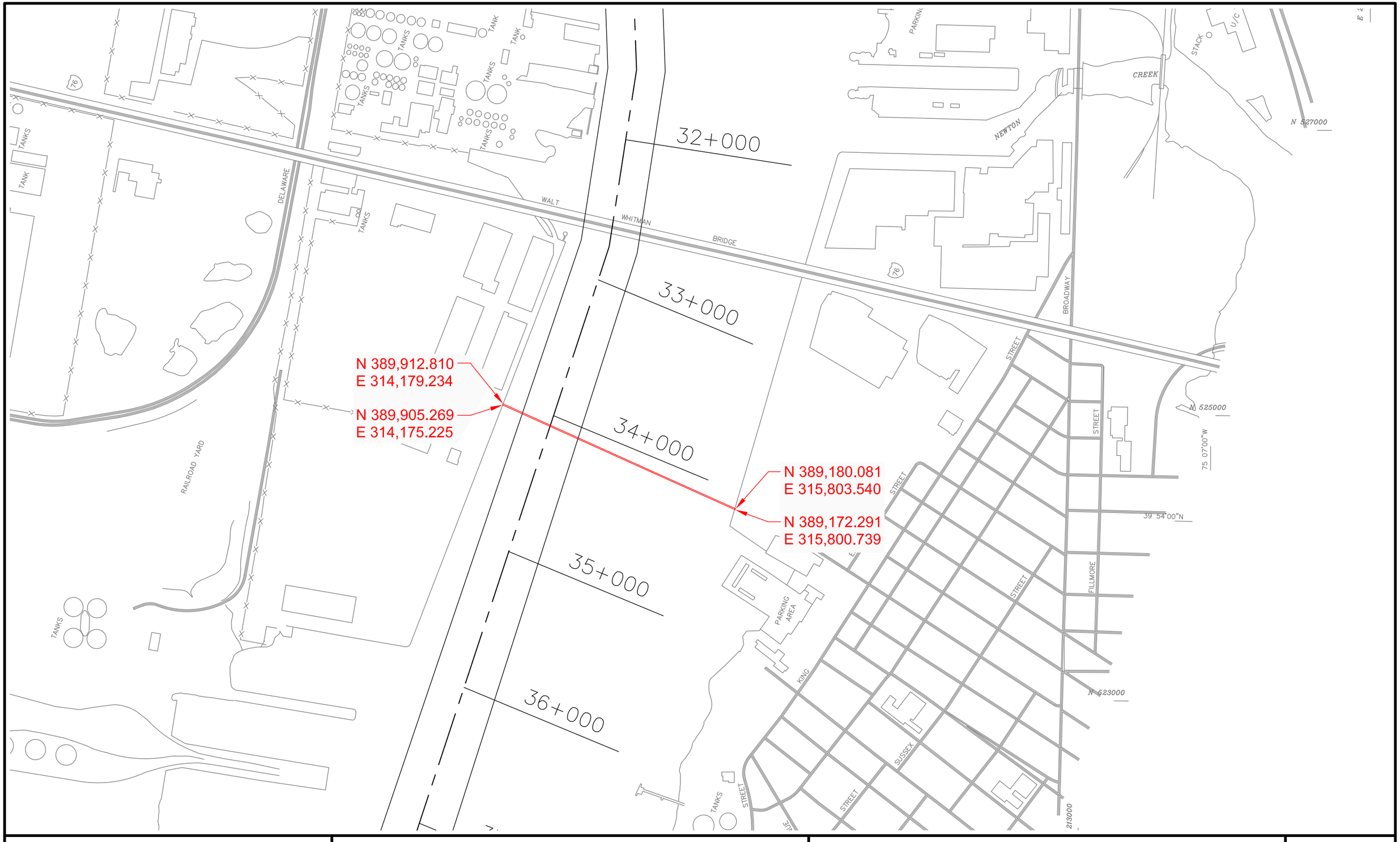
Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

WILLIAMS GAS PIPELINE
TRANSCO (Y & Y2)

Utilities Y & Y2 – 2-10” gas pipelines
GBA plan & profile drawings from as-built



GBA
ENGINEERS ★ SURVEYORS

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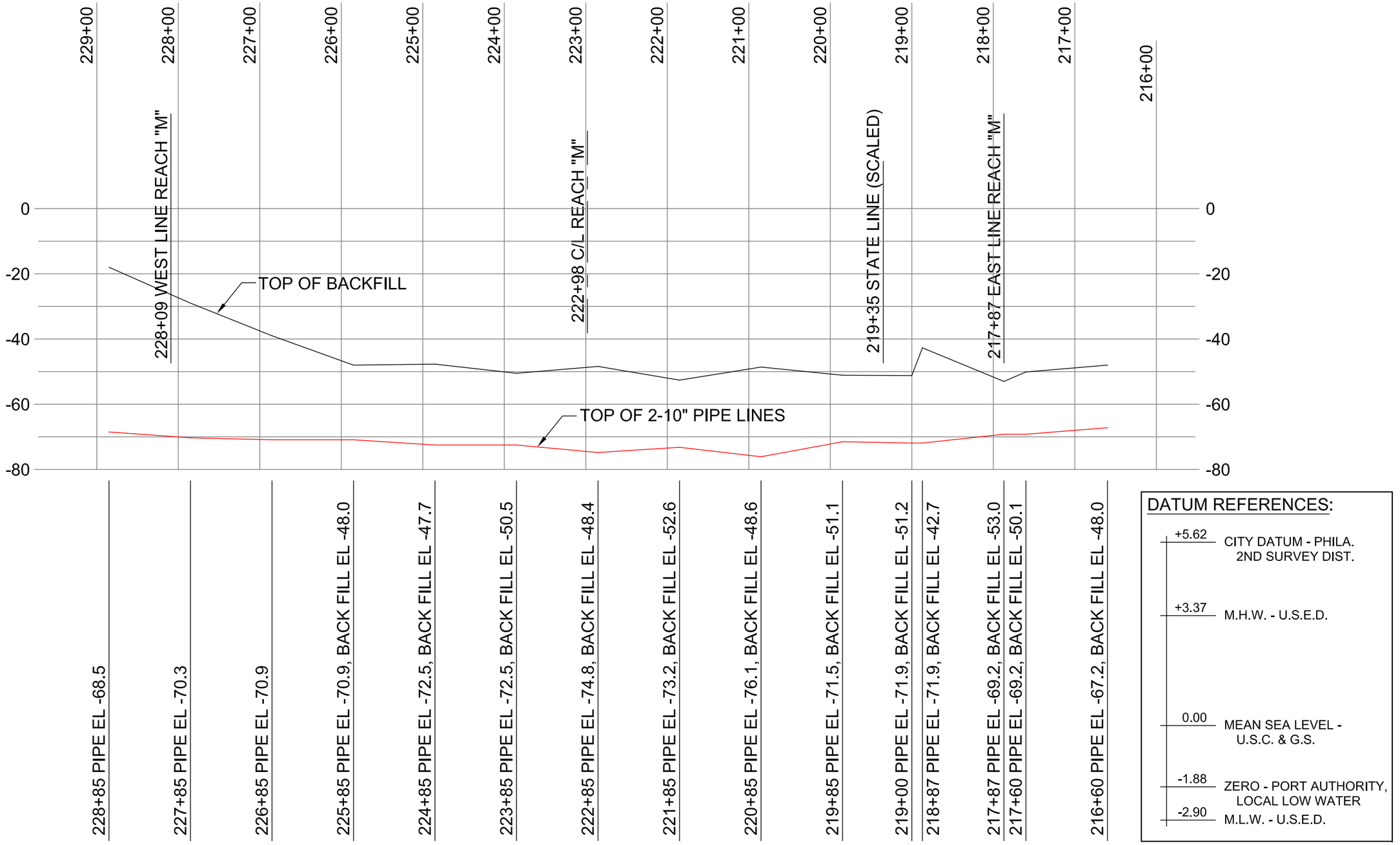
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807-1195
TEL. (302) 652-4948
FAX (302) 655-9218
GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: EMAIL DATED MAY 14, 2010
FROM WILLIAMS GAS PIPELINE TRANSCO
TO USACE CONTAINING LATS/LONGS
FOR "PLANT A" PIPE LINE CROSSINGS

PLAN VIEW

FIGURE 1



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WILMINGTON, DELAWARE 19807-1195
TEL. (302) 652-4948
FAX (302) 655-9218
GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: TRANSCONTINENTAL GAS PIPE LINE CORP.
PGW PLANT "A" LAT.
DRAWING NO.: G-1966
DRAWING DATE: JULY 18, 1963

DETAIL: AS-BUILT TOP OF PIPE PROFILE

FIGURE 2

GAS PIPELINE - TRANSCO
99 Farber Road
Princeton, NJ 08540
Tel: 609-936-2400
Fax: 609-936-2430

December 14, 2011

Attn: Robert D. Henry
Gahagan & Bryant Associates
Centreville Square
5803 Kennett Pike, Suite D
Wilmington, DE 19807-1195

RE: Utility Crossing Investigation – Delaware River Federal Navigation Channel
Channel Section: Reaches A-A and A (Channel Stations 19+700 to 96+000)

Dear Mr. Henry,

We are in receipt of and have reviewed your letter dated November 21, 2011 regarding verification of the enclosed plan and profile drawings of Williams Gas Pipeline – Transco's Plant A (2-10") pipeline crossings in the Delaware River channel section known as Reaches A-A and A (Channel Stations 19+700 to 96+000).

The plan and profile information enclosed in your November 21, 2011 submission are consistent with Transcontinental Gas Pipe Line Corporation As-Built Plan & Profile Philadelphia Gas Works Plant "A" Lat. Drawing # G–1966 dated 7/18/1963 which was submitted to the U.S. Army Corps of Engineers (USACE).

The top elevation of the highest pipe within the Reaches A-A and A channel section (Sta. # 19+700 to 96+000) is approximately 60feet. Your proposed dredging depth within this channel is said to be 45 feet. Nonetheless, WGP – Transco must continue to be included in the design process for this dredging project. Please be advised that any blasting within the vicinity of WGP – Transco's facilities must be submitted for review and written approval. Also once it has been determined, please forward information on the proposed equipment and means for sediment removal within the area of WGP – Transco's facilities.

Work within the vicinity of WGP –Transco's facilities is prohibited until a WGP – Transco's representative is onsite. Please contact Joe Sacko, Assistant District Manager, at (856) 235-0900 seventy-two (72) hours prior to construction to arrange for a representative to be on site.

Enclosed, please find a copy of **WILLIAMS GAS PIPELINE REQUIREMENTS FOR LANDOWNER & THIRD PARTY CONSTRUCTION** that must be strictly adhered to when designing and/or working within the vicinity of our facilities.

Your assistance in designing the proposed Delaware River Dredging Project to meet both our requirements is greatly appreciated. Should you have any questions or need any additional information, please feel free to contact me at (609) 936-2413.

Sincerely,

By: _____
Richard Ricketts
Division Engineer

Cc:

Joe Sacko
Mt. Laurel

Charles F. Sutphen, P.G.
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

Michael Hart
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

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(302) 652-4948 FAX (302) 655-9218

GBA
ENGINEERS ★ SURVEYORS

April 13, 2012

Richard Ricketts
Division Engineer
Williams - Transco
99 Farber Road
Princeton, NJ 08540

Subject: Utility Crossing Investigation – Delaware River Federal Navigation Channel

Dear Mr. Ricketts:

As you are aware, the Philadelphia Regional Port Authority (PRPA) along with the U.S. Army Corps of Engineers (Corps) is currently deepening the Delaware River Main Channel from its present maintained depth of 40-feet below mean lower low water (MLLW) to 45-feet below MLLW. Gahagan & Bryant Associates, Inc. (GBA) has been contracted by PRPA to identify and verify all submarine utility crossings within Reaches A-A and A prior to the commencement of dredging operations.

The deepening will include one to two feet of over-depth dredging, depending on whether the material is unconsolidated sediments or rock. The next sections of the channel to be dredged are areas known as Reaches A-A and A (see attached map), which are located approximately between the South Jersey Port Corporation's Beckett Street Terminal (just south of the Ben Franklin Bridge) and the Philadelphia International Airport (Channel Stations 19+700 to 96+000). It is anticipated that dredging of these areas will begin this summer.

You were contacted by me on November 21, 2011, to request verification of known utility crossings operated by Williams Gas Pipeline – Transco within Reaches A-A and A. The known crossings, both in Reach A-A, were identified as two 10" pipelines crossing the channel at approximately Channel Stations 34+100 and 34+090, respectively. A 12 foot long as-built drawing of the two pipelines (TRANSCO Drawing No. G-1966) had been previously provided to me by the Corps. You were provided a plan view and a section view of the pipeline locations (attached) based on information from the as-built drawing.

A review of the as-built drawing for the two 10" pipelines shows:

- The vertical datum used was stated as USC&GS Mean Sea Level.
- A Datum Reference Graph on the drawing states that MLW USED is 2.90' below this datum.
- This corresponds to the as-built datum being equivalent to National Geodetic Vertical Datum 1929 (NGVD 29).
- The minimum depth of the top of pipe crossing the channel appears to be -69.2' NGVD 29.
- Conversion of the above depth to the project datum equates to -67.2' MLLW.

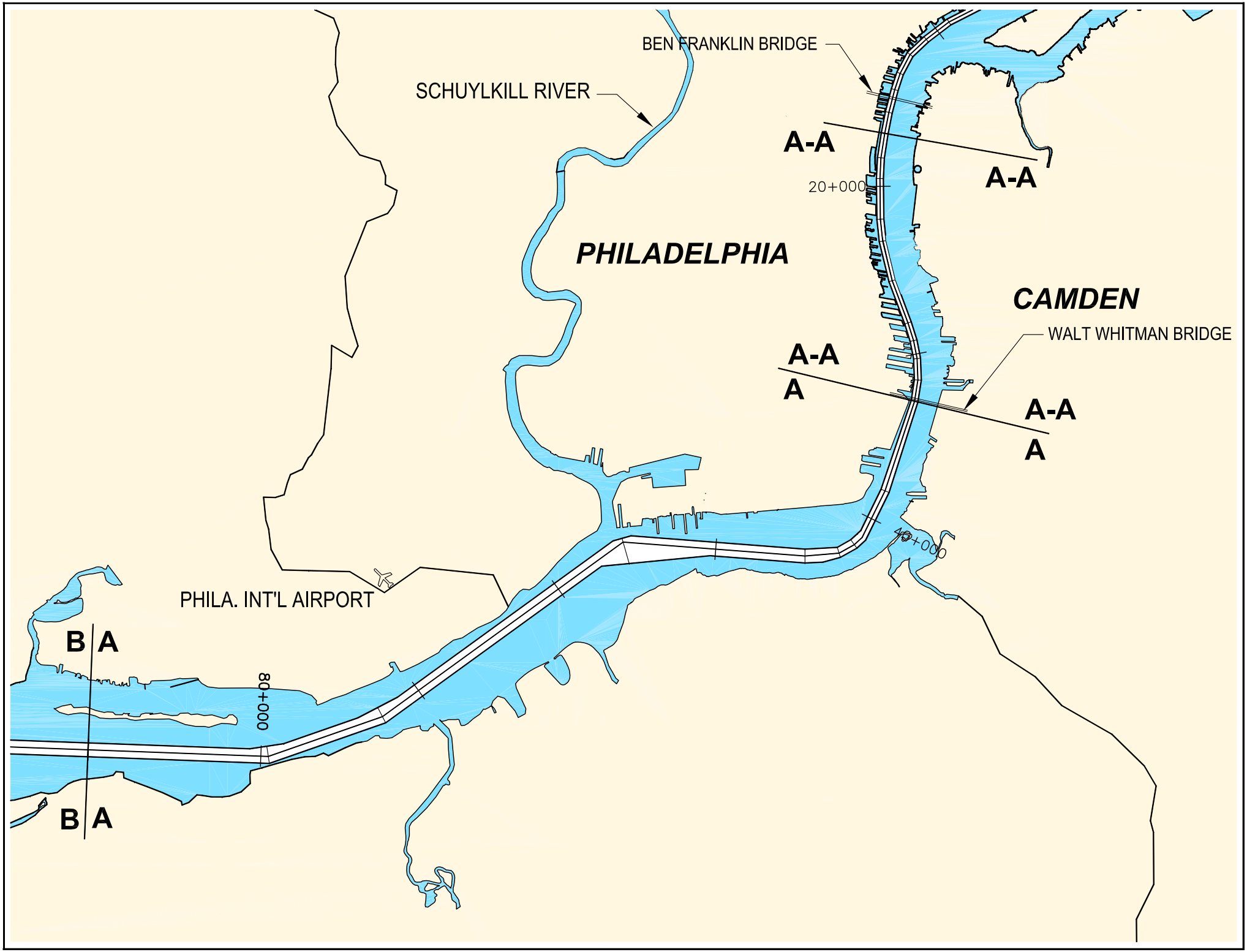
Attached is your December 14, 2011 response to my initial request. If you have any additional information to provide to me please do so **as soon as possible, but no later than April 30, 2012.** If you have no additional information to provide, please confirm that the information referenced above properly documents the status and location of the utilities. Please be advised that GBA is relying on the information you provide to enable the Corps to dredge safely. It is GBA's understanding that neither GBA, PRPA, nor the Corps can be held responsible for any reported locations and depths that prove to be inaccurate.

We appreciate your assistance in this verification process. Please contact me if you have any questions.

Sincerely,

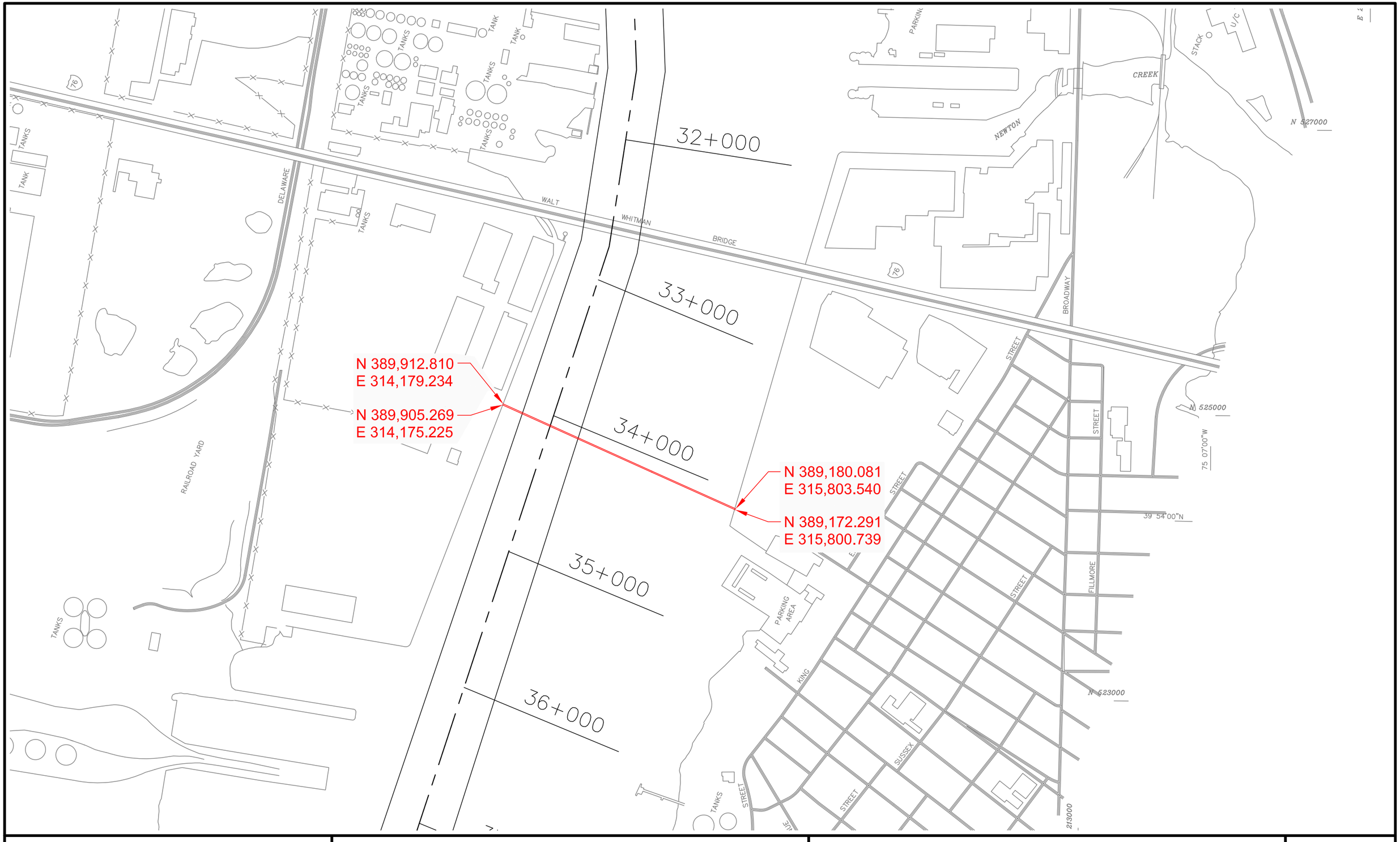
Robert D. Henry

Robert D. Henry
Associate


BEN FRANKLIN BRIDGE
SCHUYLKILL RIVER
A-A
A-A
20+000
PHILADELPHIA
CAMDEN
WALT WHITMAN BRIDGE
A-A
A
A-A
A
40+000
PHILA. INT'L AIRPORT
B A
80+000
B A

WILLIAMS GAS PIPELINE
TRANSCO (Y & Y2)

Utilities Y & Y2 – 2-10” gas pipelines
GBA plan & profile drawings from as-built



GBA
ENGINEERS ★ SURVEYORS

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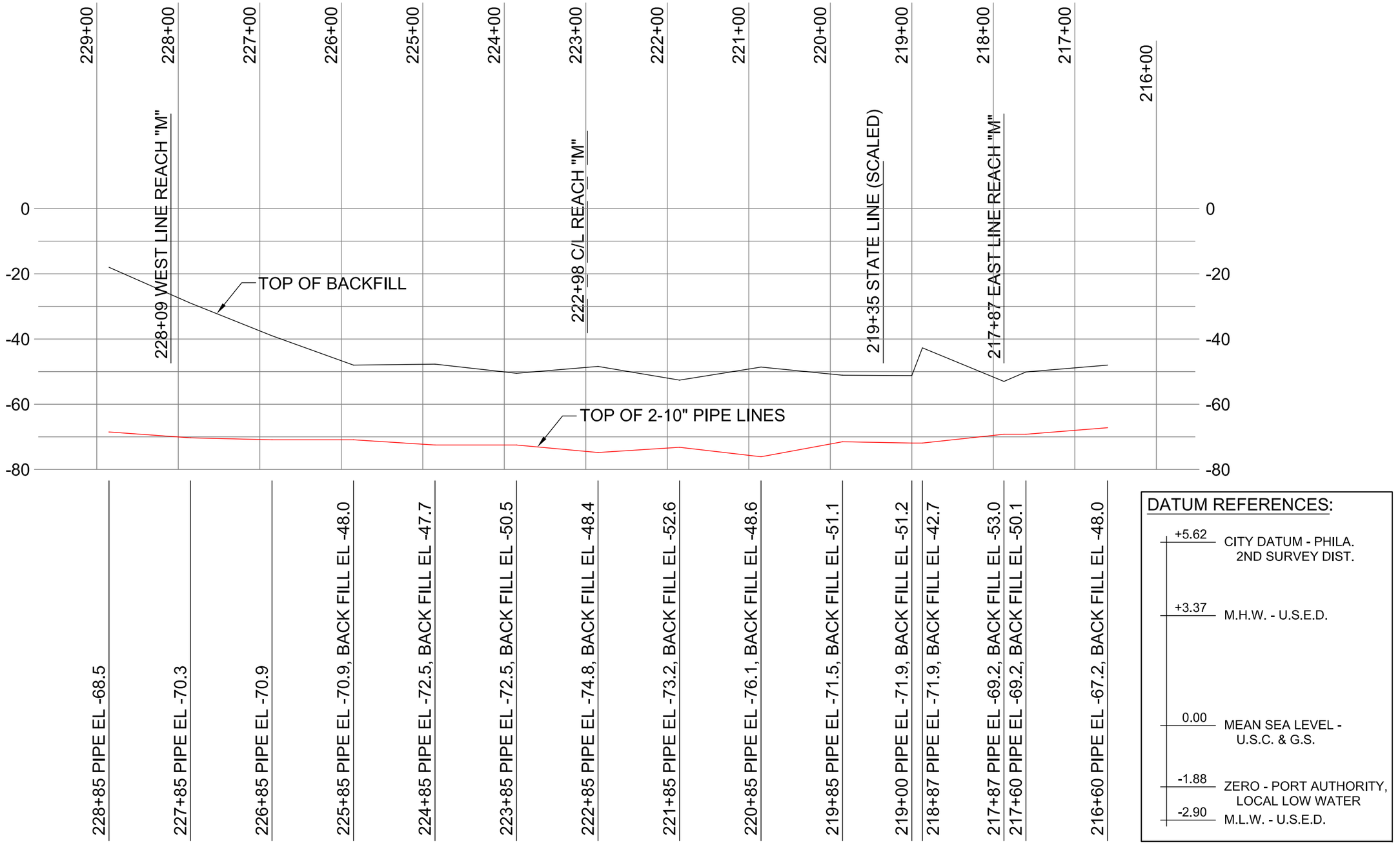
5803 KENNETT PIKE, SUITE D
CENTREVILLE SQUARE
WILMINGTON, DELAWARE 19807-1195
TEL. (302) 652-4948
FAX (302) 655-9218
GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: EMAIL DATED MAY 14, 2010
FROM WILLIAMS GAS PIPELINE TRANSCO
TO USACE CONTAINING LATS/LONGS
FOR "PLANT A" PIPE LINE CROSSINGS

PLAN VIEW

FIGURE 1



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FAX (302) 655-9218
GBAWILMINGTON@GBA-INC.COM

DATA SOURCE: TRANSCONTINENTAL GAS PIPE LINE CORP.
PGW PLANT "A" LAT.
DRAWING NO.: G-1966
DRAWING DATE: JULY 18, 1963

DETAIL: AS-BUILT TOP OF PIPE PROFILE

FIGURE 2

GAS PIPELINE - TRANSCO
99 Farber Road
Princeton, NJ 08540
Tel: 609-936-2400
Fax: 609-936-2430

December 14, 2011

Attn: Robert D. Henry
Gahagan & Bryant Associates
Centreville Square
5803 Kennett Pike, Suite D
Wilmington, DE 19807-1195

RE: Utility Crossing Investigation – Delaware River Federal Navigation Channel
Channel Section: Reaches A-A and A (Channel Stations 19+700 to 96+000)

Dear Mr. Henry,

We are in receipt of and have reviewed your letter dated November 21, 2011 regarding verification of the enclosed plan and profile drawings of Williams Gas Pipeline – Transco's Plant A (2-10") pipeline crossings in the Delaware River channel section known as Reaches A-A and A (Channel Stations 19+700 to 96+000).

The plan and profile information enclosed in your November 21, 2011 submission are consistent with Transcontinental Gas Pipe Line Corporation As-Built Plan & Profile Philadelphia Gas Works Plant "A" Lat. Drawing # G–1966 dated 7/18/1963 which was submitted to the U.S. Army Corps of Engineers (USACE).

The top elevation of the highest pipe within the Reaches A-A and A channel section (Sta. # 19+700 to 96+000) is approximately 60feet. Your proposed dredging depth within this channel is said to be 45 feet. Nonetheless, WGP – Transco must continue to be included in the design process for this dredging project. Please be advised that any blasting within the vicinity of WGP – Transco's facilities must be submitted for review and written approval. Also once it has been determined, please forward information on the proposed equipment and means for sediment removal within the area of WGP – Transco's facilities.

Work within the vicinity of WGP –Transco's facilities is prohibited until a WGP – Transco's representative is onsite. Please contact Joe Sacko, Assistant District Manager, at (856) 235-0900 seventy-two (72) hours prior to construction to arrange for a representative to be on site.

Enclosed, please find a copy of **WILLIAMS GAS PIPELINE REQUIREMENTS FOR LANDOWNER & THIRD PARTY CONSTRUCTION** that must be strictly adhered to when designing and/or working within the vicinity of our facilities.

Your assistance in designing the proposed Delaware River Dredging Project to meet both our requirements is greatly appreciated. Should you have any questions or need any additional information, please feel free to contact me at (609) 936-2413.

Sincerely,

By: _____
Richard Ricketts
Division Engineer

Cc:

Joe Sacko
Mt. Laurel

Charles F. Sutphen, P.G.
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

Michael Hart
US Army Corps Of Engineer
Wanamaker Building
100 Penn Square
East Philadelphia, PA 19107-3390

APPENDIX D

Landside Survey Report

INTRODUCTION

On February 6, 2012, Gahagan & Bryant Associates, Inc. (GBA) performed a field survey of the locations of the east and west ends of several utility crossings located from Station 15+000 to 96+000 in the Reaches A-A & A portions of the Delaware River Deepening Project. The east ends of each crossing are located in the State of New Jersey. The west end locations are situated in the Commonwealth of Pennsylvania.

FIELD SURVEY

Horizontal location was performed utilizing a Trimble R5 Real Time Kinematic (RTK) GPS Rover. Positions were observed utilizing corrections being transmitted from the RTK base situated at a control point located in Paulsboro, New Jersey. This control point has been checked and utilized for a dredging project located in the Delaware River at the proposed Paulsboro Marine Terminal. The RTK rover was checked at another known control point nearby to verify the base position.

Horizontal positions noted are New Jersey State Plane (NAD 83). Latitudes and Longitudes are also shown.

Delaware River Utility Crossings – Reaches A-A & A
February 2012

The utilities located are identified as follows:

Company	Contact Person	Description
Conoco Phillips	Mike McGee	1 - 8-inch Gas Pipeline
Sunoco Logistics	Greg Byrne	Bundle – Directionally Drilled (DD)
Sunoco Logistics	Greg Byrne	1 - 12-inch Gas Pipeline
Colonial Gas	Rob Andersen	2 - 10-inch Gas Pipelines (1 inactive)
Williams (Transco)	Joe Sacko	2 - 10-inch Gas Pipeline
PBF Energy	Bob Kraft	1 - 8-inch Gas Pipeline
Buckeye Partners LP	Jeff Waites	1 - 12-inch Gas Pipeline (DD)
Buckeye Partners LP	Jeff Waites	1 - 10-inch Gas Pipeline
Buckeye Partners LP	Jeff Waites	1 - 8-inch Gas Pipeline
Buckeye Partners LP	Jeff Waites	1 - 24-inch Gas Pipeline

The Conoco 8" Gas pipeline was pointed out by their representative on the New Jersey side. Standpipes were visible and located on the Pennsylvania side. The Sunoco 12" Gas pipeline is parallel and located just to the northeast of the Conoco line. The New Jersey side was pointed out by the Sunoco representative. The Pennsylvania side was not physically located where the alignment reaches the shore. It is assumed that this line is parallel to the Conoco line before turning towards the utility marker that is located further inland.

The Sunoco bundle that is directionally drilled was pointed out by their representative on the New Jersey side. Markers were visible and located on the Pennsylvania side.

All other utility crossings were pointed out by representatives and located as noted herein.

Delaware River Utility Crossings – Reaches A-A & A
February 2012

PBF Energy Gas Pipeline (1-8" Gas Pipeline)

PA Location
N 374305.13 Lat. N 39°51'30.81"
E 278488.30 Long. W 075°15'39.77"

PBF Energy 8" Marker (looking south)

NJ Location
N 370171.00 Lat. N 39°50'50.01"
E 279183.67 Long. W 075°15'30.41"

PBF Energy 8" Marker(looking south)

Delaware River Utility Crossings – Reaches A-A & A

February 2012

Colonial Pipeline Co. (2-10" Gas Pipelines*)

PA Location (Inactive)

N 377428.95 Lat. N 39°52'02.53"
E 288792.09 Long. W 075°13'27.97"

Colonial Gas marker–inactive (looking north)

PA Location (Active)

N 377426.59 Lat. N 39°52'02.51"
E 288801.73 Long. W 075°13'27.85"

Colonial Gas marker–active (looking north)

NJ Location (Inactive)

N 372542.05 Lat. N 39°51'14.47"
E 291828.46 Long. W 075°12'48.53"

Colonial Gas marker-inactive (looking south)

NJ Location (Active)

N 372546.36 Lat. N 39°51'14.52"
E 291852.71 Long. W 075°12'48.22"

Colonial Gas marker-active (looking north)

Delaware River Utility Crossings – Reaches A-A & A

February 2012

Sunoco Logistics (Directionally Drilled Bundle)

PA Location

N 374390.01 Lat. N 39°51'31.96"
E 282244.92 Long. W 075°14'51.61"

Sunoco DD Bundle (looking south)

NJ Location

N 370247.88 Lat. N 39°50'50.92"
E 280904.05 Long. W 075°15'08.36"

Sunoco DD Bundle (looking north)

Sunoco Logistics (12" Gas Pipeline)

PA Location

N 378175.47 Lat. N 39°52'09.99"
E 289867.98 Long. W 075°13'14.25"

Sunoco 12" Gas (Looking north)

NJ Location

N 372789.02 Lat. N 39°51'16.95"
E 292295.21 Long. W 075°12'42.57"

Sunoco 12" Gas (Looking south)

Delaware River Utility Crossings – Reaches A-A & A
February 2012

Conoco Phillips
(1-8” Gas Pipeline)

PA Location
N 378171.86 Lat. N 39°52’09.96”
E 289863.06 Long. W 075°13’14.31”

Conoco 8” Gas (Looking south)

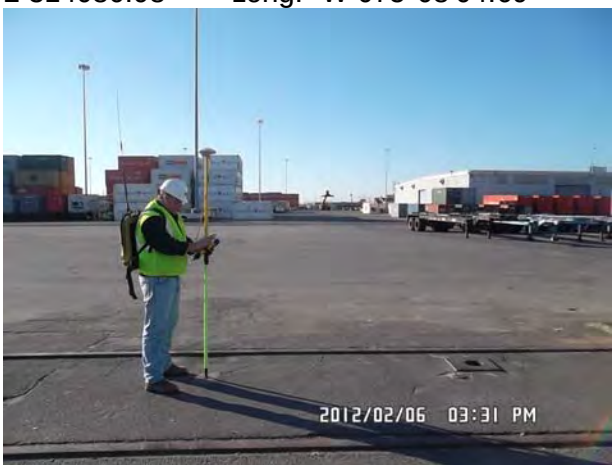
East Location
N 372785.40 Lat. N 39°51’16.91”
E 292290.30 Long. W 075°12’42.63”

Conoco 8” Gas (looking south)

Delaware River Utility Crossings – Reach Reaches A-A & A
February 2012

Transco Gas Pipeline (Williams)
(2-10" Gas Pipelines)

PA Location (west)
N 389933.51 Lat. N 39°54'08.01"
E 314086.98 Long. W 075°08'04.69"



Transco Gas (Williams)-PA-looking north

PA Location (east)
N 389925.90 Lat. N 39°54'07.93"
E 314083.55 Long. W 075°08'04.74"

Transco Gas (Williams)-PA-looking south

NJ Location (west)
N 388904.53 Lat. N 39°53'57.95"
E 316364.26 Long. W 075°07'35.41"

Transco Gas (Williams)-west-NJ-looking north

NJ Location (east)
N 388899.26 Lat. N 39°53'58.00"
E 316362.10 Long. W 075°07'35.38"

Transco Gas (Williams)-east-NJ-looking north

Delaware River Utility Crossings – Reaches A-A & A

February 2012

Buckeye Gas Pipeline (1-8" Gas Pipeline)

PA Location (abandoned?)

N 374308.00 Lat. N 39°51'30.84"
E 278481.79 Long. W 075°15'39.86"

Buckeye 10" (same as 12"DD on PA side)

NJ Location (abandoned?)

N 370158.25 Lat. N 39°50'49.89"
E 279184.69 Long. W 075°15'30.39"

Buckeye 10" Gas (NJ)

Buckeye Gas Pipeline (1-12" Gas Pipeline – Directionally Drilled)

PA Location

N 377652.45 Lat. N 39°52'04.76"
E 289097.43 Long. W 075°13'24.08"

Buckeye 12" DD (same as 10" on PA side)

NJ Location

N 372664.92 Lat. N 39°51'15.71"
E 292098.96 Long. W 075°12'45.07"

Buckeye 12" DD Gas (NJ)

Delaware River Utility Crossings – Reaches A-A & A

February 2012

Buckeye Gas Pipeline (1-8" Gas Pipeline)

PA Location
N 374306.34 Lat. N 39°51'30.83"
E 278493.69 Long. W 075°15'39.71

Buckeye 8" PA

NJ Location
N 370171.05 Lat. N 39°50'50.01"
E 279183.69 Long. W 075°15'30.41"

Buckeye 8" Gas (NJ)

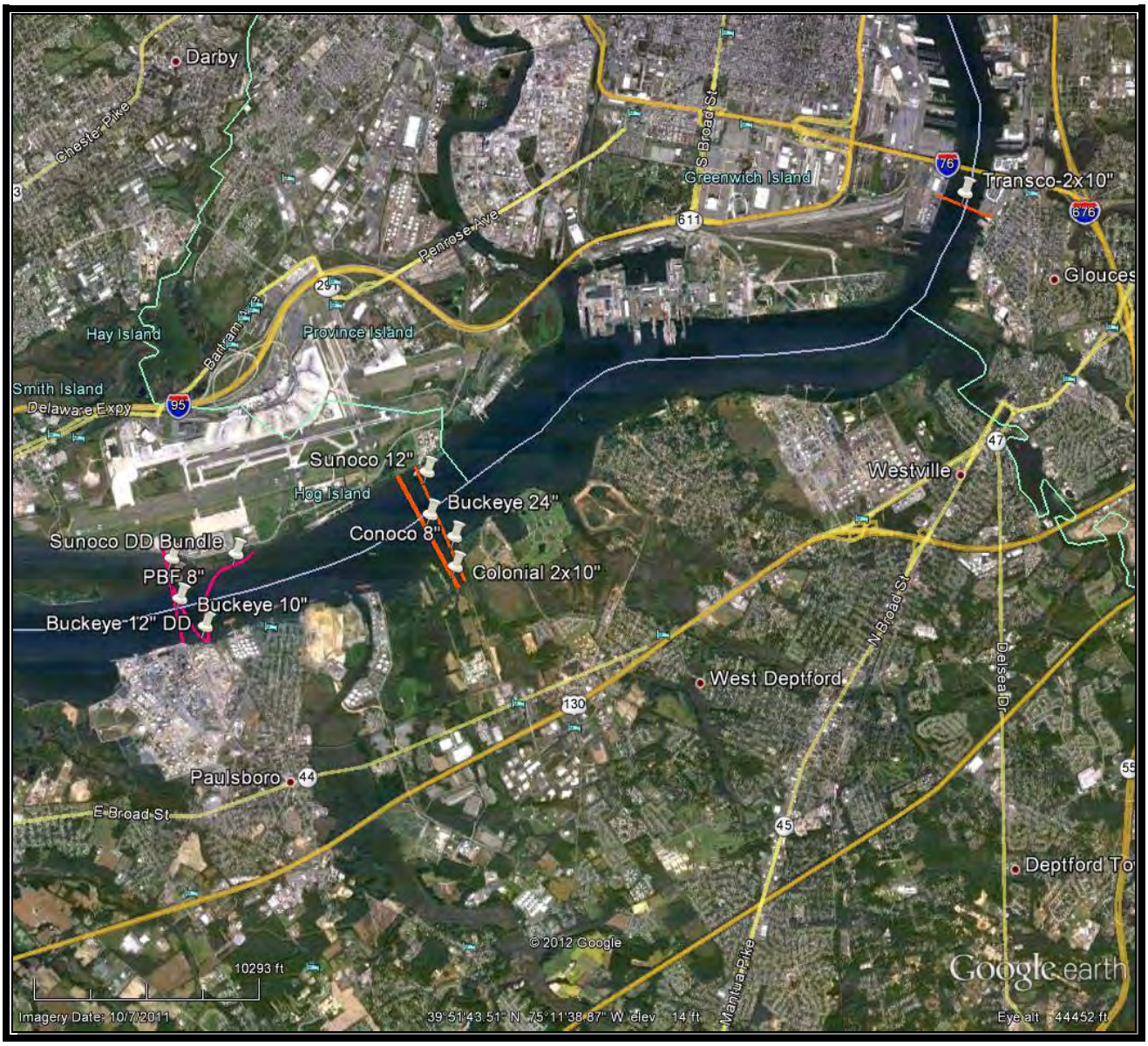
Buckeye Gas Pipeline (1-24" Gas Pipeline)

PA Location
N 377652.45 Lat. N 39°52'04.76"
E 289097.43 Long. W 075°13'24.08"

Buckeye 24" PA

NJ Location
N 372664.92 Lat. N 39°51'15.71"
E 292098.96 Long. W 075°12'45.07"

Buckeye 12" DD Gas (NJ)



Delaware River Utility Crossings – Reaches A-A & A
February 2012

office locations

GBA Tampa
3802 West Bay to Bay Boulevard
Suite B-22
Tampa, FL 33629-6826
(813) 831-4408 Fax (813) 831-4216

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Greenville Center, Building C
Wilmington, DE 19807-2321
(302) 652-4948 Fax (302) 655-9218

GBA Baltimore
9008-O Yellow Brick Road
Baltimore, MD 21237-5608
(410) 682-5595 Fax (410) 682-2175

GBA Houston
9330 Kirby Drive
Suite 100
Houston, TX 77054-2515
(832) 377-4800 Fax (832) 377-4802

GBA North Carolina
295-A North Green Meadows Drive
Dutch Square Industrial Park
Wilmington, NC 28405-3933
(910) 313-3338 Fax (910) 313-6822

GBA San Francisco Bay Area
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Suite 200
Rohnert Park, CA 94928-7919
(707) 595-3492 Fax (707) 595-3520

GBA Philadelphia
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Philadelphia, PA 19134-6311
(215) 425-6283 Fax (215) 425-6284

GBA Portland
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Camas, WA 98607-0823
(360) 210-4292

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263 Wharf Street
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